FIRE SAFETY *is our business, too!*

Dependable CLARK Fire Pump Motor Starters are on guard in thousands of buildings to help prevent disaster like that above. We have been in this business for nearly half a century and have been pioneers in the field.

CLARK Fire Pump Controls are available in non-automatic and combined automatic—non-automatic types. They are approved by Underwriters' Laboratories, Factory Mutual Association and conform to National Fire Protection Association standards. Because of this approval, CLARK Fire Pump Controllers on your systems earn the lowest possible insurance rates.

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

From Plant Engineer to Veep

M. C. Patterson was promoted recently to the position of vice president and car operations manager of car manufacturing operations of Dodge Corp.

Mr. Patterson began his automotive career as a die sinker machinist for Dodge shortly after his arrival in the United States from Scotland in 1921. Later he was transferred to the layout and machine drafting department where he remained until 1925 when he was moved into plant engineering.

In 1930, he became assistant plant engineer of the Dodge Main Plant and plant engineer in 1938. He held this post for ten years, becoming general works manager in 1948. In February, 1955, Patterson became a vice president of Dodge with responsibility for the manufacturing operations.

Standards on Sprinkler Systems

REVISED STANDARDS applying to the installation of automatic sprinkler systems has been published by the National Fire Protection Association.

Designated NFPA No. 13, "Standards for the Installation of Sprinkler Systems," the booklet includes general information on sprinkler systems; how to classify various properties according to their fire hazards; preparation of buildings prior to making sprinkler installations; water supplies and fire department connections.

It also includes recommended specifications on piping, valves, pipe fittings, etc.

This 162-page pamphlet is available from the National Fire Protection Association, 60 Batterymarch St., Boston, Massachusetts, at $1 per copy.

Personnel Changes at Mando

TWO PERSONNEL CHANGES in the Canadian engineering staffs of the Minnesota and Ontario Paper Co., Minneapolis, Minn., were announced recently.

E. O. Wood, Kenora resident engineer, retains his present title but will be freed from his plant maintenance responsibilities to act in a full-time liaison capacity between Mando and H. A. Simons, Ltd. He joined Mando in 1945 as a junior engineer at Fort Frances. He was promoted to engineer in 1947 and, in 1950, was transferred to Kenora as plant engineer. He became a resident engineer in July, 1954.

J. W. G. Belanger was promoted to the position of plant engineer, to take over the mill maintenance responsibilities formerly handled by Mr. E. O. Wood. Belanger first worked for Mando during summer vacations in 1946, 1947 and 1948. He became a full-time employee in 1951, at which time he was placed on the Kenora engineering staff.

Maytag Helps the Teachers

FOUR PROFESSORS from Michigan State University recently visited The Maytag Co. to gather data and take movies of various production operations which will be used for classroom instructions.

They collected material on the company's automatic washer clutch assembly. This data will be used as problem material for a planned integrated sequence of engineering courses for seniors in industrial engineering.

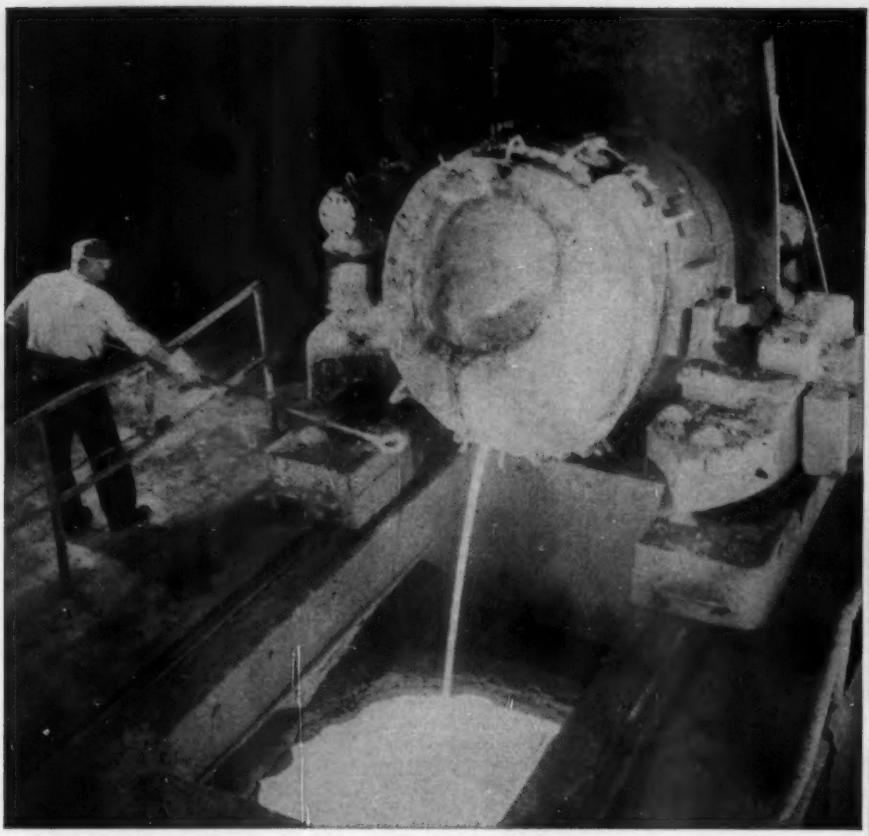
Four professors from Michigan State gather clutch assembly material from Maytag's industrial engineering staff to be used in classroom instructions

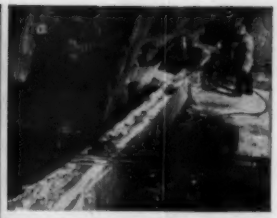
The course will cover the standard subject matter, but instead of theoretical material, the students will be using "live" material—facts and figures from this case study.

Course on Carbides

THREE SPECIAL sessions devoted to milling cutter applications of carbide and two special sessions on the application of carbide as wear-retarding components have been added to the customer training courses to be offered the first half of

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of Address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.





Melting pig iron in the cupolas

Purifying iron in bessemer

An exact iron silicate is tapped

"Sponge ball" goes to the press

This exclusive 5-minute operation gives WROUGHT IRON built-in protection against corrosion

The pig iron has been melted in the cupolas . . . purified by the bessemer converter. An exact iron silicate has been readied in special rotary furnaces and moved by ladle beneath the machine holding the highly refined, molten iron . . . everything is ready for the key step.

The signal is given. The processing machine tips its ladle forward. Molten refined iron flows at a controlled, predetermined rate into the ladle holding the melted silicate. This operation is shown above. The falling iron stream penetrates into the silicate, then separates into droplets. Liberated gas from within bursts apart the solidifying droplets. The shattered fragments settle continuously to form a "spongy mass"—welding hot—in the molten silicate.

This "sponge," weighing three tons or more, is pressed into a rectangular block called a "bloom." Giant rolling mills give final form to the useful material—WROUGHT IRON.

Because the thousands of fibers of silicate gathered in the mixing operation and distributed through the body of high-purity iron are unaffected by corrosion, they establish a "defense in depth" against corrosive attack. This is why wrought iron stays on the job longer, at lower cost per year.

Our booklet, *The ABC's of Wrought Iron*, tells more of this story. Send for your copy.

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CORROSION COSTS YOU MORE THAN WROUGHT IRON

WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY STEEL PRODUCTS

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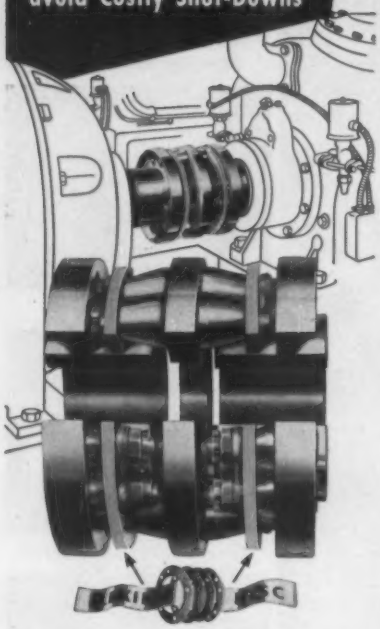
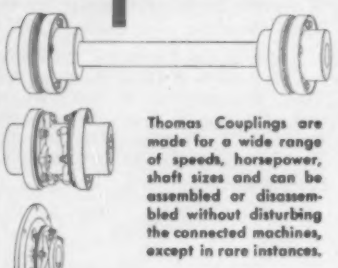
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.
For more facts circle 504 on Reply Card

'ROUND ABOUT

1956. The courses are presented by the Carboloy Department of General Electric Co., Detroit.

According to the company, regular training courses on cutting tools also will be given as in the past. The new milling sessions will include instructions on carbide grade selection, brazing, grinding, discussion on milling speeds, table travel and machine horsepower, as well as step versus conventional mill demonstrations.

Sessions on carbides as wear-retarding components will cover methods of attaching carbides, design considerations and grinding procedures.

Cemented carbides users among their employees are eligible to attend the training courses. Readers who are interested should send their application to News Bureau, Carboloy Department of General Electric Co., Detroit 32, Michigan.

Construction Picture in '56

RATE OF INDUSTRIAL construction in 1956 may exceed the boom year of 1955 by as much as 15 or 20 per cent, according to the appraisals of field men for Walter Kidde Constructors, Inc., engineers and builders.

The 1955 industrial trends supporting construction activity appear to be continuing and even intensifying. Some of these trends are: 1. Modernization and expansion of facilities; 2. Expansion of capital available for construction by virtue of mergers; 3. Product diversification moves; and 4. Technological improvements in products, processes and equipment.

This is supported by a report from Johns-Manville Corp., stating that the urgent need for expansion and further modernization of the nation's industrial plants, may account for $2.8 billion being spent on new plants alone in 1956, a 17 per cent increase over 1955.

In the construction industry picture, the one segment that surpasses all others is the modernization, repair and maintenance market which will spend over $21 billion, about one-third of total construction volume in 1956.

Flame-Resistant Paper

SINCE ALL industries use paper or paperboard for one means or another, they will be interested in the Recommended Commercial Standard for Flame-Resistant Paper and Paperboard.

The standard was proposed by a group of paper manufacturers, and has been adjusted in accordance with the comments of other interests. It provides a method of testing and rating the flame resistance of all types of paper and paperboard, not over 0.020 in. thick, that have been treated to prevent the spread of flame when ignited; and a means for identification of quality. By adhering to this standard, it is believed that manufacturers, distributors and users will be able to effect a reduction in personal injury and loss of property.

This standard is identified by the designation TS-5282. Copies may be obtained while the supply lasts by addressing a request to H. A. Bonnet, Commodity Standards Division, U. S. Dept. of Commerce, Washington 25, D.C.

Fourth Welding Show in Buffalo

TWENTY-ONE TECHNICAL sessions are being planned for the fourth Welding Show. The show will be held at Memorial Auditorium, Buffalo, New York, from May 9 to the 11th.

Advance registration forms and hotel information may be obtained by writing to the American Welding Society, 33 West 39th St., New York 18, N. Y.

Military Personnel and Magazine Editors Tour Fansteel

Air Force Reserve officers and Chicago area industrial magazine editors recently toured Fansteel Metallurgical Corp., North Chicago, Ill., for a briefing on the use of refractory metals for industrial and military purposes. From left to right, are: Col H. G. Carson, Commonwealth Edison Co.; Col R. H. Morris, Plant Engineering; Dr. F. H. Driggs, president of Fansteel; Col W. C. Burdick, Naess & Murphy; Gen. J. A. Teece, vice president of Fansteel; Col R. L. Finkenstaedt, of the Farm-Rite Implement Company; and Col W. C. Lent, of The Seng Co.

The Grinnell Model R Constant-Support Pipe Hanger is available now in an *extended range* of sizes to provide completely overlapping coverage of loads from 47 lbs. to 32,267 lbs., and with travels up to 12 inches. New design modifications permit these hangers to be installed with a minimum of headroom, ranging from 29 inches (rod take-out) for the largest size — down to 10¾ inches for the smallest size.

The Model R provides constant support which is mathematically perfect for all positions of travel. This constancy of support is maintained throughout the full range of field adjustability. Needle bearings minimize friction.

Grinnell Constant-Supports are individually calibrated to support the exact load specified. All Model R Constant-Supports have a full 70 percentage points of field adjustability built into them. No less than 10% of this adjustability is allowed either side of calibration for plus or minus change in load. Field re-adjustments are easily made by turning a single load adjustment bolt.

Grinnell designs, manufactures, and distributes a complete line of pipe hangers and supports for every piping requirement. Grinnell maintains an experienced staff of engineers in the field — ready to assist you on the job with any piping problem.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPLIES

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pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

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FOAMGLAS®

the cellular, stay-dry insulation

STAYS DRY—Cut a piece from your sample. Place it in water. Note how the hermetically-sealed glass cells filled with dead air keep it afloat. Weight it down for days, weeks or longer if you like. Remove the weight and it bobs back to the surface . . . proof that the sealed cells have absorbed no water, still have their original insulating efficiency.

VAPOR-PROOF — With a nail file, cut a ¼" thick slice from your sample. Hold it to your lips and try to blow smoke through it. The smoke won't penetrate . . . proof that FOAMGLAS is a positive vapor barrier in itself.

STRONG AND RIGID — Place your FOAMGLAS block on the floor. Stand on it. Note how it supports your weight without crushing. Compressive strength is over seven tons per square foot . . . making it ideal for load bearing applications.

WON'T BURN — Hold a flame to your sample. You'll see at once that it does not burn . . . an important safety feature in all construction. It's even acid-proof and rodent-proof as you can prove if you happen to have a vial of acid or a pet rat handy.

Send for a sample and make these simple tests!

Prove to yourself that FOAMGLAS is your ideal insulation!

Let us send you a free sample of FOAMGLAS. Use it to make the few simple tests illustrated. You'll prove that this unique cellular glass insulation has exactly the right combination of properties to assure you of these vital benefits: constant insulating efficiency . . . long, maintenance-free life . . . strength and rigidity for a variety of structural applications . . . ease of handling and installation.

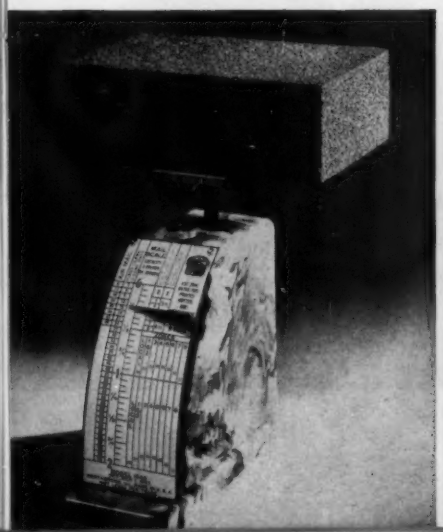
Thousands of actual users have proved in actual performance the benefits so clearly demonstrated by these tests. No wonder, then, that new users every day are picking FOAMGLAS to insulate the roofs, ceilings, walls and floors of all types of buildings, low temperature spaces, piping and equipment. Send for a sample today and make your own tests. Use the handy coupon, or write . . .

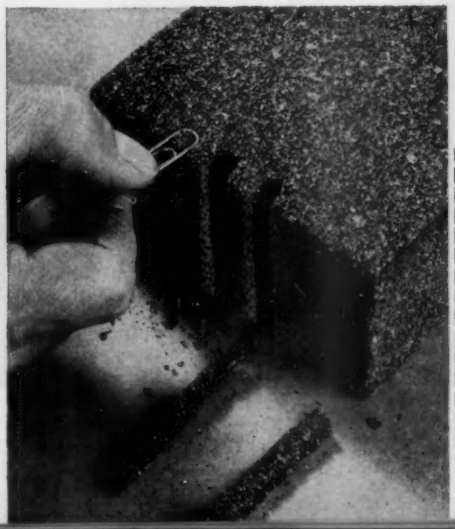
Pittsburgh Corning Corporation

Department PE-26, One Gateway Center
Pittsburgh 22, Pa.
In Canada: 57 Bloor Street West, Toronto, Ontario

LIGHT WEIGHT — Just pick up your sample to see how light and easy to handle it is. Check actual weight on your company's postal scale if you wish. The density of FOAMGLAS is only 9 pounds per cubic foot.

EASY TO SHAPE AND CUT—Shave some strips off your sample with an ordinary paper clip . . . workmen use knives, saws or trowels for quick shaping and fitting on the job.





Pittsburgh Corning Corporation
Dept. PE-26, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ontario

Please send me a sample of FOAMGLAS for testing.

Name_____

Company_____ Title_____

Address_____

City_____ Zone____ State_____

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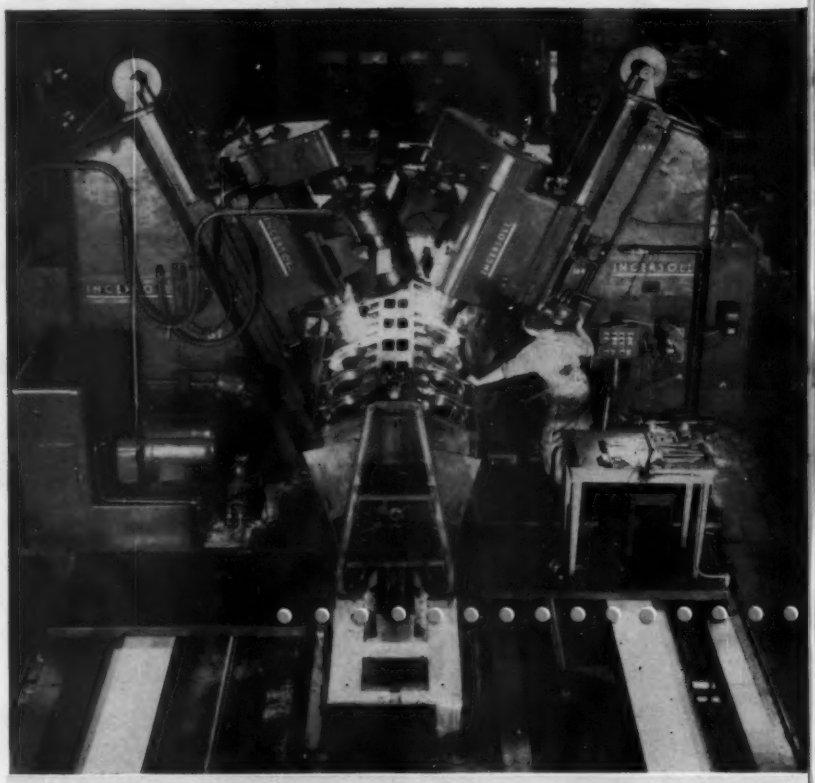

Gulf Quality Lubricants safeguard costly equipment like this in the Electro-Motive Plant. Leading Gulf brands used here include Gulf Harmony Oil for hydraulic systems; Gulf Gem Oil for spindles; Gulfcrest Oil for turbines; Gulf Anti-Friction Grease, Gulf Precision Grease; Gulf HM Grease, Gulf High Pressure Grease, and Gulf Plastic Petroleum B for various grease lubricating applications.

The New York Central is one of scores of railroads that use Gulf Dieselmotive Oil for better lubrication of their Diesel locomotives and lower maintenance costs.

Gulf Quality Lubricants

help maintain production of Electro-Motive Diesels

in the plant

and contribute to top performance

on the rails

The Electro-Motive Division of General Motors at LaGrange, Illinois, has invested millions of dollars in equipment to produce the famous EMD Diesel locomotives for the nation's railroads. And they make sure that this huge investment is well protected by proper lubrication—largely with Gulf Quality Lubricating Oils and Greases.

When you see an EMD locomotive on the rails, there is a good chance it's lubricated with Gulf Dieselmotive Oil, the modern Diesel locomotive lubricant. This outstanding oil is used by practically every leading railroad in Gulf's marketing territory.

For specific lubrication information for your equipment—and for expert help on any problem that involves lubricants or lubrication—call in a Gulf Sales Engineer. He can help you discover opportunities for important savings in operating and maintenance costs. Write, wire or phone your nearest Gulf office.

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Name _____

Company _____ Title _____

Address _____

City _____ State _____

TRANTER PLATECOILS® GIVE YOU

SIZZLE INSTEAD OF FIZZLE

IN PROCESS HEATING APPLICATIONS

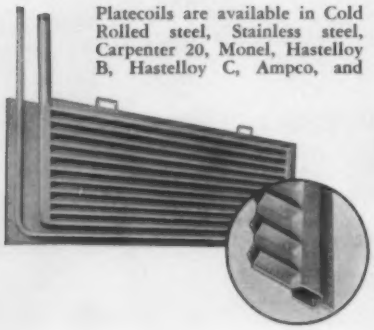
You get heat transfer when you need it and where you need it when you use Tranter Platecoils. Actual experience has proved Platecoils give faster, more efficient heat transfer than old-fashioned pipe coils. The continuous, rigid, and relatively flat surfaces of Platecoil units provide greater prime heat transfer surface in a smaller space than do pipe coils. Being smaller and compact, Platecoils can be positioned in a tank or vat to give the heating or cooling where it is needed. Speed heat up time, reduce downtime, increase tank capacity and shorten operating cycles — use Tranter Platecoils to make production sizzle instead of fizzle.

THESE ADVANTAGES CUT COSTS

Platecoils are installed on easy, quick-change hangers. Platecoils can be installed or replaced in minutes without a hoist or other machinery. Made in standard sizes to give standardized, dependable performance, Platecoils save on engineering and fabricating time. Because of greater heating efficiency Platecoils make savings on initial cost that range up to the spectacular in special alloys.

NOW AVAILABLE IN THESE METALS

Platecoils are available in Cold Rolled steel, Stainless steel, Carpenter 20, Monel, Hastelloy B, Hastelloy C, Ampco, and Nickel. Orders for Cold Rolled steel and Stainless steel get fast delivery from factory-tested stock.



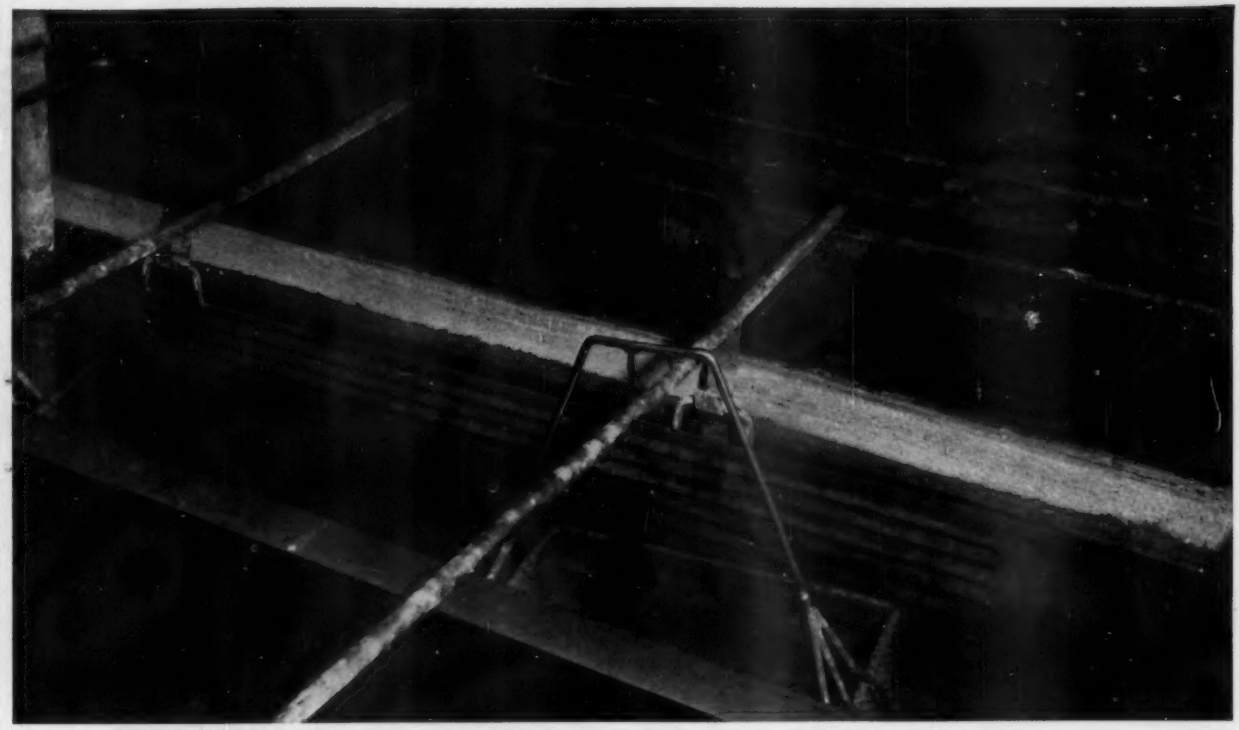
PLATECOIL®

DIVISION

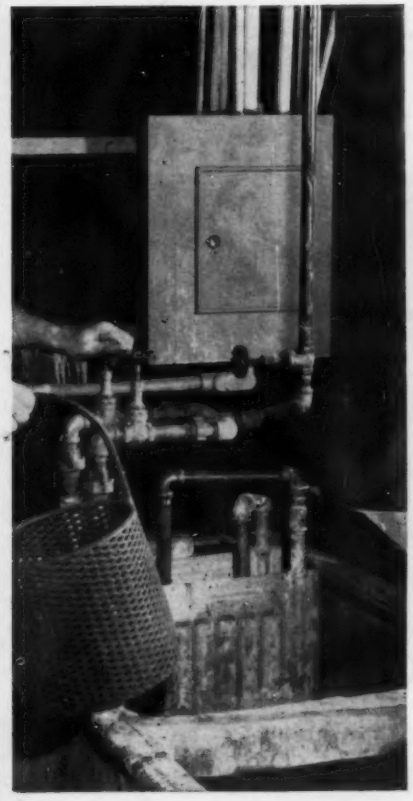
TRANTER MANUFACTURING, inc.

780 E. Hazel St., Lansing 4, Michigan

INCREASED PRODUCTION 25%

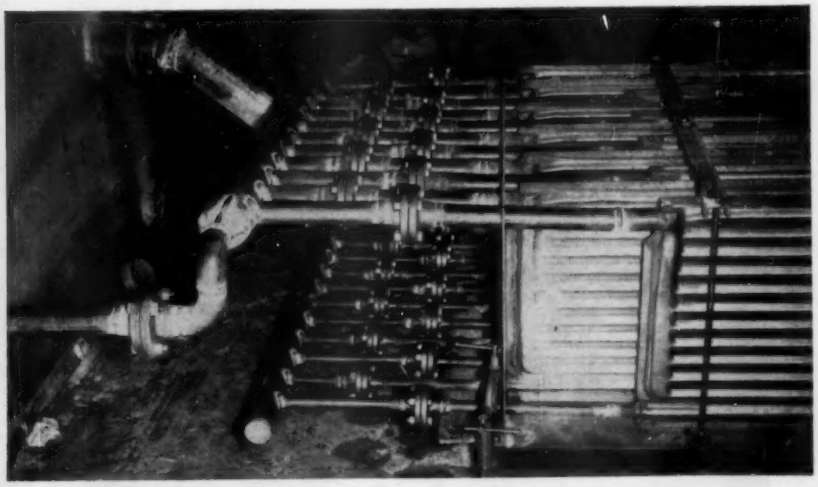


Two Platecoil units, 22" wide and 83" long, hung on either side of this aluminum anodizing tank at Jack & Heintz, Inc., have increased production in this department by 25%. Made of type 316 Stainless Steel to resist corrosion from the anodizing solution, they keep the solution at the desired 70°F temperature without the downtime between batches needed by the former cooling method that required pumping the anodizing solution to a separate cooling tank and back.



SAVED SPACE, INSTALLATION AND MAINTENANCE COSTS

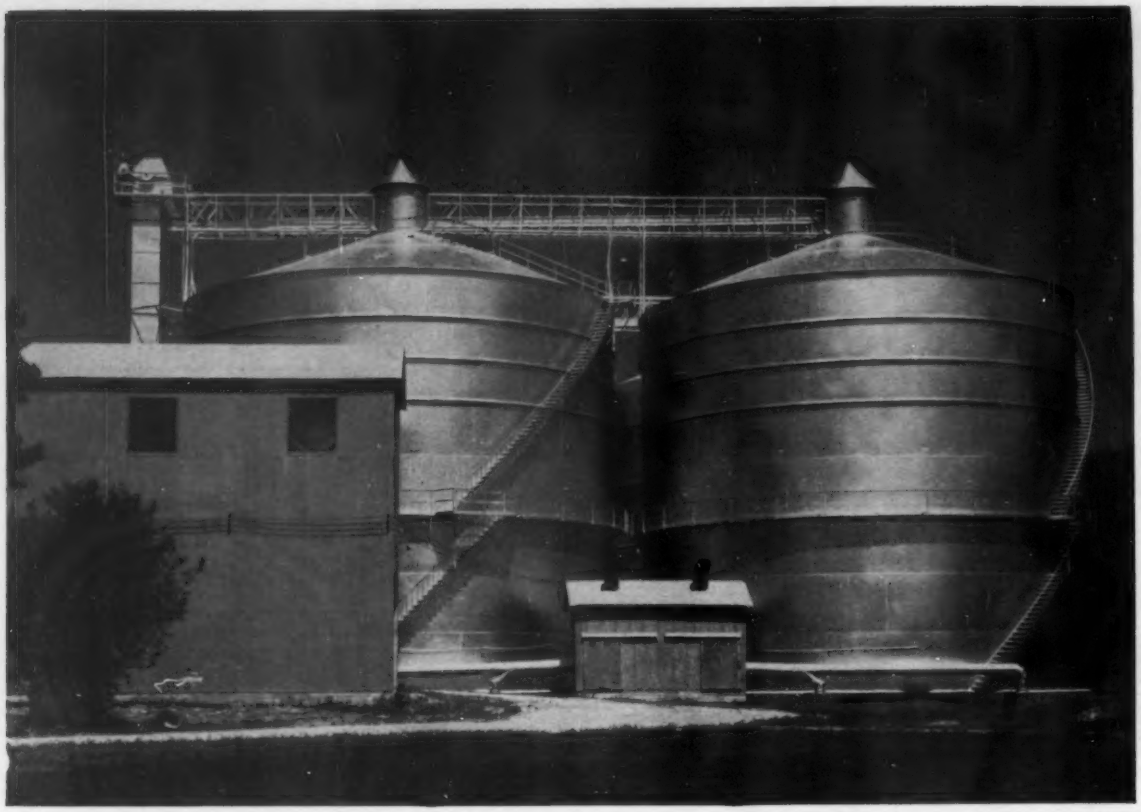
Dexter Industries, Inc. uses Platecoils to heat plating solutions, cleaners, pickling, etching and oxidizing (shown at left) solutions. They report heat up time has dropped substantially and maintenance and downtime due to pipe coil failure has been slashed to bring big savings. Dexter also specifies Platecoils in original equipment.



STEAM COSTS REDUCED 96%

A bank of 11 Platecoils in the bottom of a 250,000-gallon tar storage tank is used by Old Colony Tar Co. to replace a coil of 750 feet of 2-inch pipe to heat tar for removal to a tank car or truck. With pipe coil, it was necessary to heat the entire contents of the tank for each draw-off which cost $100 each time. With Platecoils it is only necessary to heat the tar being removed which costs only $4.00 per removal.

For more facts circle 508 on Reply Card



CB&I tanks like these may be your answer for clean, dry storage

Shown are two 200,000-bushel Horton® steel tanks installed for soybean storage at the Osceola Products Company, Osceola, Arkansas. They are 70-feet in diameter and 60-feet high. A ventilating system in the bottom of each tank draws air down through the seed and cools it whenever excessive moisture causes the contents of the tank to become heated.

Perhaps this installation will suggest the answer to a problem that you may have involving the storage of clean, dry, free-flowing products.

Write our nearest office for estimates or quotations on any type of storage tank for liquids, gases, or free-flowing solids.

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Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
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NEW *Corrulux*® SHATTERPROOF FLAT PANES IN STOCK SIZES!

Rock-throwing, slingshot practice or baseball season need no longer be a maintenance nightmare. And kids can stay out of trouble.

New shatterproof Corrulux Flat Panes can practically eliminate window light replacement costs brought about by "kid" hazards as well as by normal industrial hazards.

Corrulux Flat Panes are available in seven stock sizes, packaged and ready for use. They are manufactured in Skylight Green and Maxlite, colors engineered to give efficient lighting with lowered eye fatigue. Flat sheets available in sizes up to 44" wide and 10' long.

Check your local distributor or mail the coupon below.

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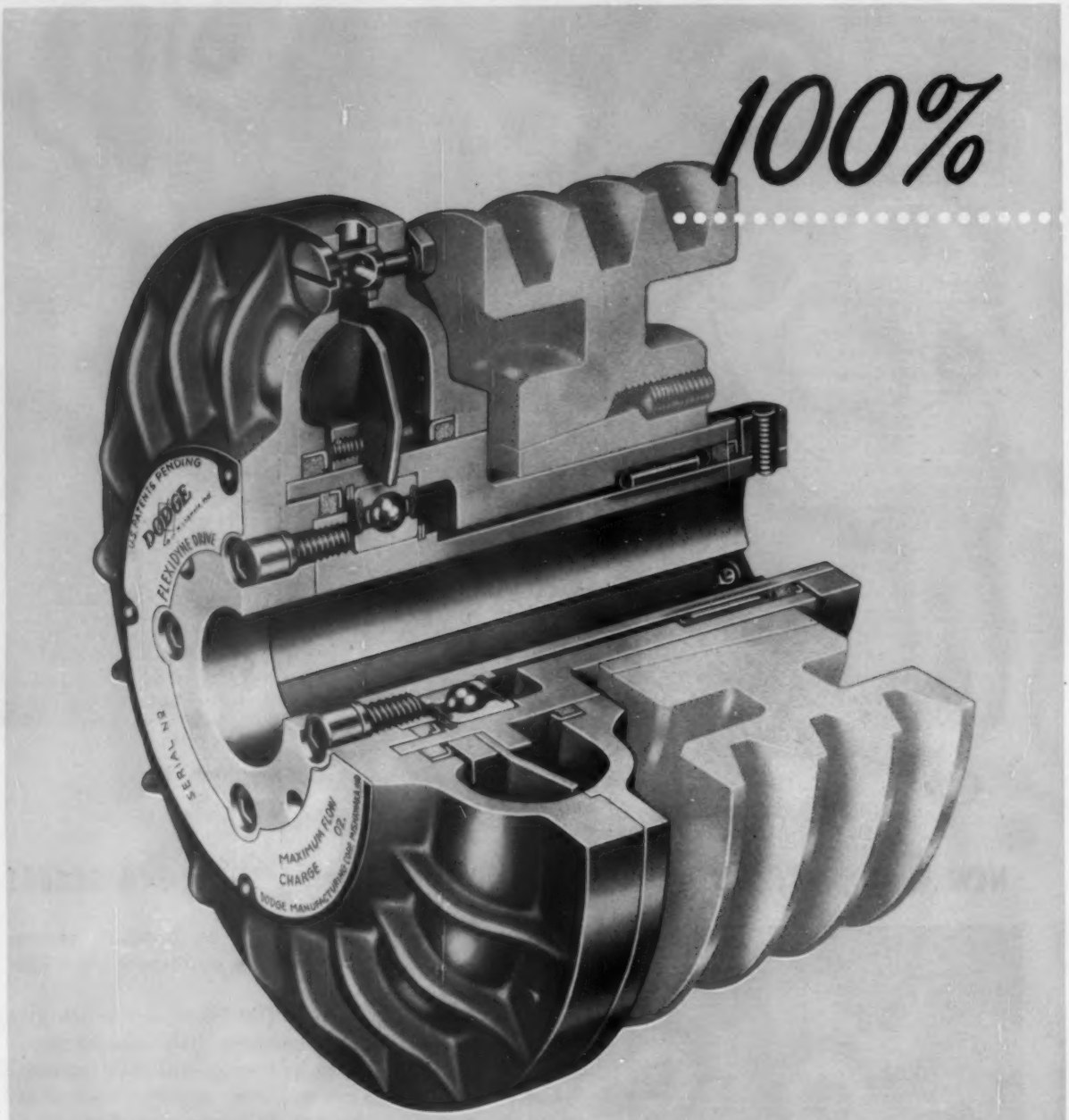


THE NEW DEVELOPMENT THAT

— STARTS LOADS SMOOTHLY

— PROTECTS AGAINST SHOCKS AND OVERLOADS

— SAVES POWER

— GIVES 100% EFFICIENCY AT FULL LOAD

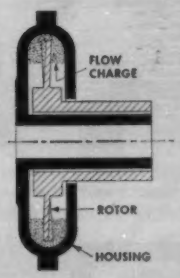
Efficiency at Full Load!

FLEXIDYNE

THE DRY FLUID DRIVE

Field experience proves that the new principle employed in Flexidyne provides a better way to handle difficult drive problems.

The "dry fluid" in Flexidyne is heat treated steel shot. A measured amount, called the flow charge, is contained in the housing, which is keyed to the motor shaft. When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, wedging it between the housing and the rotor which transmits power to the load.



After a momentary slip between housing and rotor the two become locked together and achieve full load speed without slip and at 100% efficiency during the running cycle.

Flexidyne is easy to select *off the shelf.* Each size has a standard horsepower rating, yet the flow charge can be varied quickly to give you tailor-made torque to suit the job.

Write for bulletin A-640, or call your Dodge Distributor now about Flexidyne Drives and Flexidyne Couplings.

DODGE MANUFACTURING CORPORATION
2700 Union Street, Mishawaka, Indiana

FLEXIDYNE AT WORK TURNS IN GREAT PERFORMANCE RECORD!

Flexidyne Drives and Couplings are now being delivered from stock. Already reports like these are coming in about Flexidyne performance in many tough assignments.

RAILROAD CAR PULLERS
"Starts fine... summer or winter!"

CONVEYORS
"We start under full load now!"

COTTON CARDS
"Finally... the soft start!"

TRAVELING CRANES
"Spots our loads... and how!"

PUMPS
"Now we are using smaller motors, too!"

VENTILATING FANS
"Takes off smooth as silk!"

...AND OTHER HEAVY INERTIA LOADS
"Wonderful performance!"

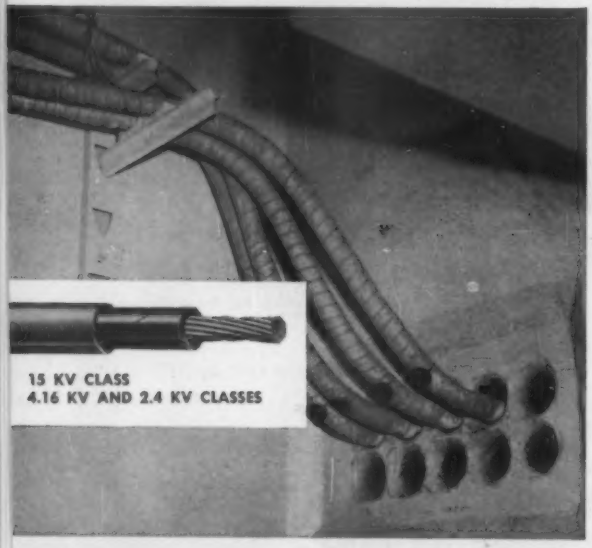
CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone book, or write us.

DODGE
of Mishawaka, Ind.

15 KV CLASS
4.16 KV AND 2.4 KV CLASSES

▲ G-E INTERLOCKED ARMOR CABLE For use above ground. Both indoor and outdoor runs. Cable runs along elevated pipe structure. Supported by racks, trays, or messengers.

▼ G-E VARNISHED CAMBRIC LEADED CABLE For conventional underground installation. High impulse strength for voltage surges. The lead sheath is impervious to moisture.



15 KV CLASS
4.16 KV AND 2.4 KV CLASSES

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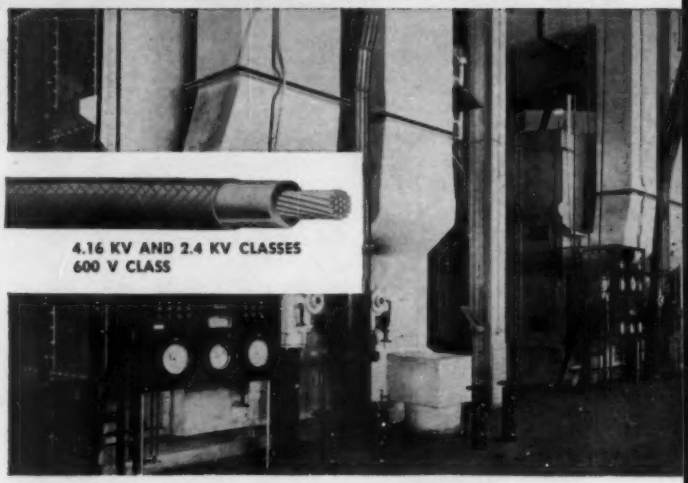
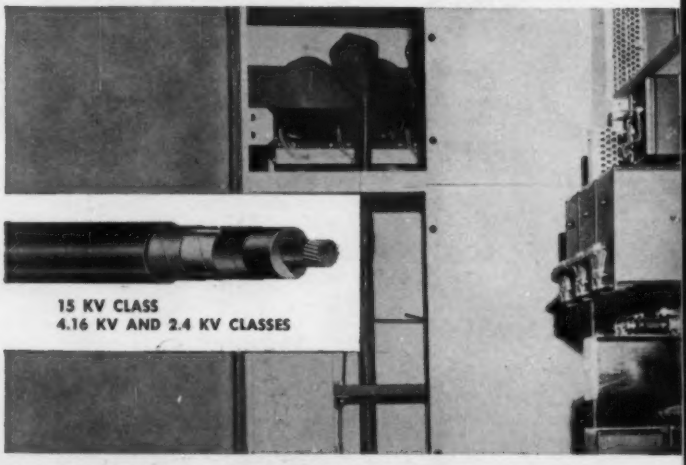


4.16 KV AND 2.4 KV CLASSES
600 V CLASS

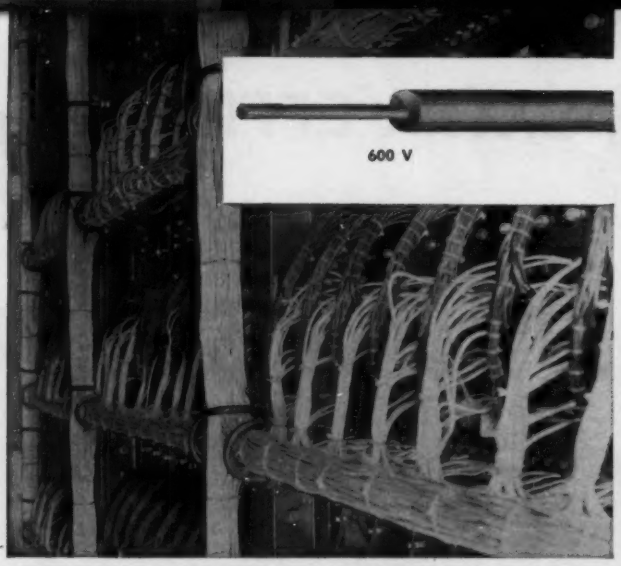
G-E SILICONE RUBBER CABLE For use where high ambient temperatures, high humidity, corrosive vapors and other severe operating conditions exist. Extra reliability in case of nearby fire.



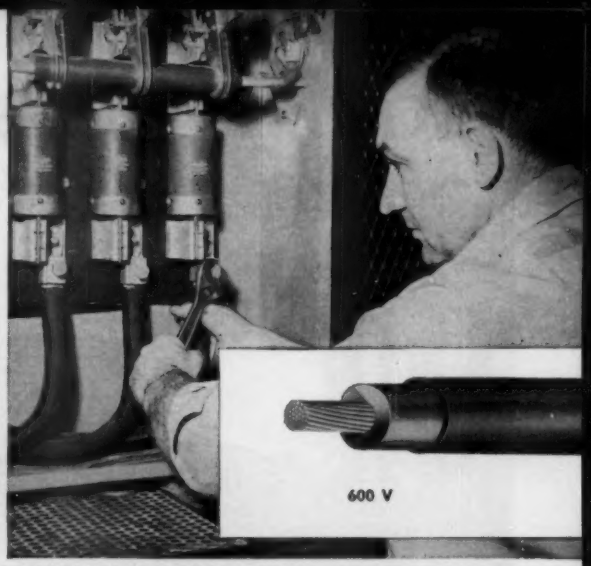
15 KV CLASS
4.16 KV AND 2.4 KV CLASSES

G-E SUPER CORONOL* GEOPRENE* CABLE For underground use. Duct, conduit, and raceway installations, or burying cable directly in the ground. Resists oxidation, ozone, corona, sunshine, water, etc.

G-E PREASSEMBLED AERIAL CABLE Mostly for outdoor runs. Long spans, supported by poles, towers, or buildings.



G-E FLAMENOL* CABLE The ultimate in chemical resistance above or below ground level. Single conductors in ducts, raceways, conduit, or buried.



G-E VERSATOL* GEOPRENE CABLE For cables above or below ground level. Large conductors, heavy loads. Resists moisture and chemicals. Flexible—an all-purpose cable.

TO MEET YOUR NEEDS FOR INCREASED POWER

Select a G-E cable to meet your requirements

Since reliable power supply is a vital factor in any industry, you'll be interested in high-quality cable of the right type for your application. Specify General Electric cable to meet your needs.

POWER CABLES for special or general purpose; for feeder systems, distribution systems, equipment leads and railway, shipboard, and mining applications.

CONTROL CABLES for station and communications systems and for appliance and equipment wiring.

For other industrial applications, specify General Electric Cords and Wires

G-E CORDS are available for practically every type of electrical appliance or industrial equipment.

G-E MAGNET WIRE can be furnished to meet every requirement of industry for long-lived and dependable electrical apparatus.

To meet your power requirements, select a General Electric cable, wire, or cord. Write Section W157-264, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

Progress Is Our Most Important Product

GENERAL ELECTRIC

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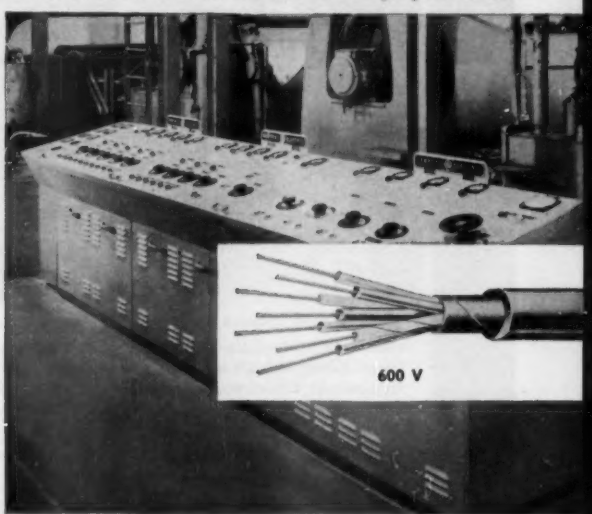
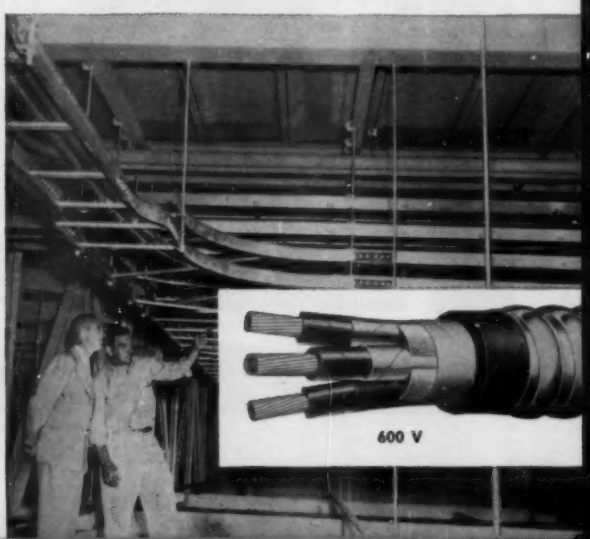


G-E FLAMENOL CONTROL CABLE For important control circuits, switchboard leads, and motor leads. Can be installed in open air, in ducts, or in conduit.

G-E VARNISHED-CAMBRIC FLAMENOL INTERLOCKED ARMOR CABLE For installation above ground. Indoor and outdoor exposures. Resists mechanical abuse.



EXTRA SAVINGS, EXTRA EFFICIENCY

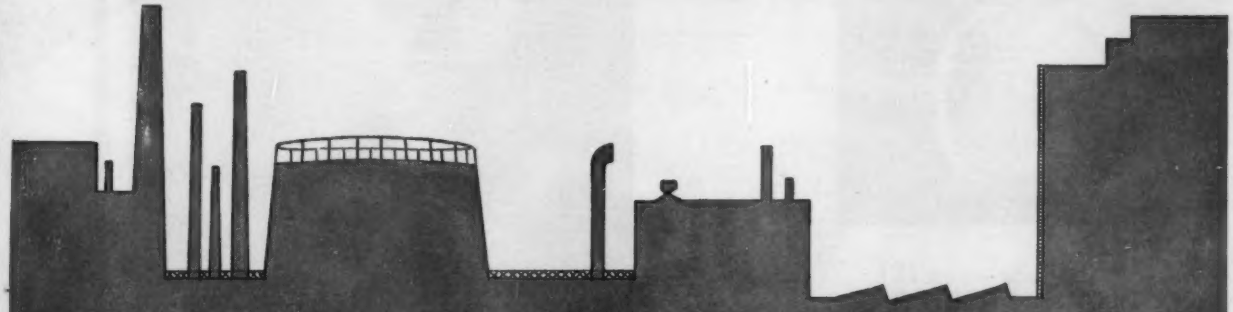
Reduce roof failures—Fiberglas Built-up Roofs are one solid mass of asphalt or tar reinforced with strong glass fibers. Fiberglas mats are inorganic, won't rot, won't wick moisture to blister roofs, outlast any organic felts. Use Fiberglas Roof Insulation, too, when you reroof—to save on heating and air conditioning costs.

End window breakage—Shatterproof, Fiberglas-reinforced paneling ends window replacement problems, gives glare-free daylighting, means better working conditions. You can choose flat or corrugated sheets in a wide variety of colors for window glazing, skylighting or sidelighting in new or existing buildings.

Pay less for cleaner air—Original cost of Dust-Stop Air Filters averages only one-tenth that of permanent filters. And replacement costs compare favorably with cost of installing and cleaning permanent filters over a period of time. Send for cost study folder and analyze the savings possible in your own ventilating systems.

Reduce insulation replacement—Kaylo Pipe and Block Insulations resist abuse of all kinds, last longer, are strong enough to walk on or place ladders against. Kaylo is moisture resistant, efficient, shrinks only 2% at top temperatures. Suited to a wide range of pipe and equipment insulation tasks at temperatures up to 1800° F.

await you in these Fiberglas materials for industry



Cut packaging costs up to 60%—Two strips of Fiberglas-reinforced tape replace six strips of ordinary paper tape in carton sealing. Cost studies show savings up to 60%. Fiberglas-reinforcement gives other papers and tapes greater strength, too, to solve many plant packaging and materials handling problems.

Reduce electrical failures—Fiberglas-insulated motors resist damage from heat and moisture . . . cut breakdowns and costly downtime, give greater capacity with less bulk. These qualities allow you to get greater performance for future needs—be sure your wiring is adequate, too; replace outdated wiring with high performance Fiberglas-insulated wire.

Cut insulation application cost—It's easy to install Fiberglas insulation on pipes or equipment. It's light in weight, can be fabricated quickly with any knife. Factory-applied jackets on pipe insulation permit use on hot, cold or outdoor piping. High efficiency permits use of lesser thicknesses. Suited for up to 400° F.

Fiberglas* products can bring real benefits to every business in a wide variety of applications. Here are just a few more:

Fiberglas Screening—resists industrial fumes, strongest screening ever made. Can be used as insect screening or as lint screen.

Noise Control Products—In plants, offices, or in your products, Fiberglas can help cut down excess noise.

Reinforcement—Fiberglas strands give strength to paper, plastics, rubber, gypsum and other materials to broaden their usage.

Industrial Building Insulation—Rigid insulating boards combined with other materials reduce cost of industrial buildings.

These are only a few samples of the many Fiberglas products you may use with profit in your business. To discover other ways Fiberglas products can fit into your plans, call your local Fiberglas Sales Office or write Owens-Corning Fiberglas Corporation, Dept. 85-B, Toledo 1, Ohio.

It's amazing the difference Fiberglas makes

OWENS-CORNING
FIBERGLAS

*T. M. Reg. O-CF. Corp.

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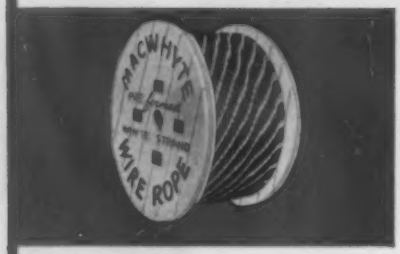


Prompt Service

SLINGS · WIRE ROPE · ASSEMBLIES

Your wire rope needs, whether they be for Round-Braided Slings, Cable Assemblies, or Wire Rope, are given prompt service by Macwhyte Company distributors.

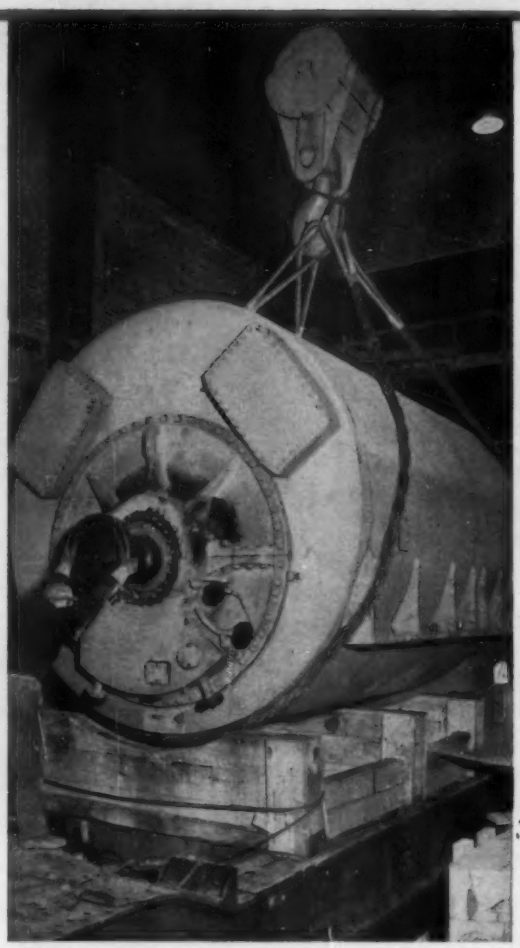
Macwhyte manufactures a wide variety of sizes and types to provide materials best suited to your needs.

MACWHYTE

SLINGS • WIRE ROPE • ASSEMBLIES

Macwhyte Company, 2991 Fourteenth Avenue
Kenosha, Wisconsin

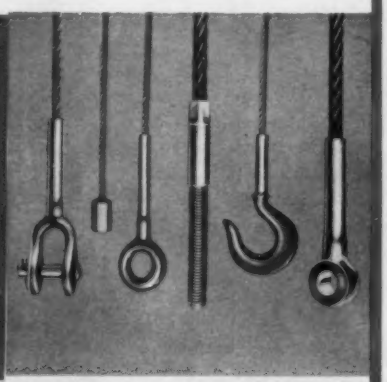
Mill depots: New York 4, 35 Water Street
Pittsburgh 19, 704 Second Avenue
Chicago 6, 228 So. Desplaines Street
St. Paul 14, 2356 Hampden Avenue
Ft. Worth 1, P. O. Box 605
Portland 9, 1603 N. W. 14th Avenue
Seattle 4, 87 Holgate Street
San Francisco 7, 188 King Street
Los Angeles 21, 2035 Sacramento



ROUND-BRAIDED SLINGS: Two Macwhyte ATLAS Round-Braided Slings handling 125-ton generator unit. These are Type No. 1 Slings made of alternate left and right lay wire rope, braided for light weight, maximum flexibility, and safety.

SLINGS: Macwhyte makes a wide range of sizes and types of Braided and Single-Part wire rope slings. Custom designs are made to meet special needs. For information, ask for Catalog S-8.

WIRE ROPE: There is a right rope for each equipment need. Catalog G-16 lists all classifications and sizes, also included is general information on handling and use of wire rope.



ASSEMBLIES: Macwhyte "Safe-Lock" Wire Rope Assemblies are made in a wide range of sizes, with fittings permanently attached to one or both ends. Many standard types are listed in Catalog No. 5201.

10858W

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BULLETINS just released and of immediate plant interest

PUMPS, PUMPING

101 Process Pumps — Twenty-pp Form 7094-B describes vertically-split single-phase and two-stage type process pumps. Provides design details, dimension tables, sectional and installation views and a chart showing interchangeability of parts throughout the line. Pumps covered offer capacities to 3200 gpm, heads to 925 ft at temperatures to 800 F. Ingersoll-Rand Co.

102 Vacuum Pumps—Bulletin 5H2. 12 pp, describes two-stage steam jet vacuum pumps, usually used where single-stage units will not provide economically a low enough suction pressure. Describes both condensing and non-condensing units. Covers applications, features of the apparatus, materials of construction, operation and operating instructions. Typical performance characteristics, sizing, data, and dimensions given. Schutte and Koerting Co.

103 For Downhill Pumping—Bulletin 855 describes a line of controlled volume pumps designed for "downhill" metering of liquids and gases. Details operation and application of the new Minus Delta P line of controlled volume pumps. Also gives specifications, capacities and important features. Illustrations and descriptive copy show applications in additive injection, bottle filling, proportional feed, fluid sampling systems. Milton Roy Co.

104 For Tough Pumping—Form 7325, 6 pp, introduces a centrifugal pump for liquids containing solids, air or gases that is described as non vapor-binding, self-venting, non-clogging and self-regulating. Shows some of the difficult pumping jobs it handles, and explains and illustrates construction features. Ingersoll-Rand Co.

105 Chemical Pumps — Eight-pp Bulletin W-350-B13 describes Worthite self-priming centrifugal chemical pumps including—standard end suction stainless steel pumps for chemical sump, tank car unloading, underground tanks, and other applications where air or vapor handling capacity is required. Major components are detailed, and coverage charts and dimensional and sectional drawings are included. Physical properties of Worthite are listed. Worthington Corp.

ELECTRICAL EQUIPMENT

106 Small Motors—Catalog F 4271-6, 8-pp, describes shaded pole a-c motors for use in industrial instruments, appliances, servomechanisms, communication equipment, and other applications. Includes photos, schematic drawings, performance characteristics in tabulated form, as well as typical specifications. Barber-Colman Co.

107 Wire and Cable—Bulletin 1096, 16-pp contains detailed information on electrical wire and cable, as well as insulation and protective covering. Two selection charts—one by application and environment and one by cable type—are a practical guide to selection of best cable for a particular application. Minimum standard industry specifications are listed. Trade names, products and applications are also given. The Okonite Co.

108 What's Standard?—"The 400 American Standards in the Electrical Field" is a 60-pp booklet designed to help plant engineers find the applicable standard on product in which they are interested. Gives briefs of each of the current IEC recommendations; a listing of all projects under Electrical Standard Board—including officers, sponsors and scopes of these projects. Also contains general information on ASA, EST and IEC. Explains how and why American Standards are developed and describes benefits. American Standards Association.

109 Service Drops — Complete information on aluminum triplex service drops is included in this 24-pp illustrated booklet. Discusses types and sizes available, tabulates cost comparisons, cites advantages and discusses methods of deadending and connector selection. In a separate section specific questions on cost, efficiency and related information are answered. Kaiser Aluminum & Chemical Corp.

110 Testing Units—This 20-pp catalog covers units for over potential testing and power supply use, along with standard meters, high voltage voltmeters, shunts, transformers, phase sequence indicators, and other electrical/electronic equipment. Product descriptions and illustrations are accompanied by schematics, performance charts and output tables to make this a data-packed handbook for proper unit selections. Company's engineering services are also indicated. Davenport Mfg. Co.

111 Electrical Connectors—Flip Seal connectors designed for increased protection against moisture, dust and metal particles, are described in this data sheet. Several types are cataloged, illustrated. Rodale Mfg. Co., Inc.

112 Electrical Fittings — Catalog 561 contains descriptive and price information on solderless fittings and electrical hardware, including splice caps, vinyl insulators, nylon insulators, Termend terminal lugs, C-24 pres-Sure-tool, insulated metallic conduit bushings and heavy gage steel knockout plugs. Includes specifications, dimensional data, applications. Buchanan Electrical Products Corp.

LIGHTING, COMMUNICATION

113 More Light For Less Money—This 8-pp bulletin, MV-403, describes typical applications of mercury vapor lamps in industrial plants, in outdoor areas and in special situations. Sixteen mercury vapor lamps are described along with their specifications and applications. Booklet also contains a list of common questions about mercury vapor lamps. Sylvania Electric Products Inc.

114 Lamp Ballasts — Illustrated Bulletin GEC-983G, 12-pp, covers company's fluorescent lamp ballasts and contains wiring diagrams for fluorescent lamp ballasting circuits, cross-section dimensions, list prices, and electrical specifications. Included are ballasts for general line fluorescents, plastic signs and outdoor applications, dimming and flashing, germicidal fluorescents, rapid-start and circline lamps, and d-c operation. General Electric Co.

115 Lighting Fixtures—Basic types, available lengths, finishes and mounting methods of this company's line of industrial fluorescent lighting fixtures are detailed in this bulletin. How optional features offer tailor-made lighting economy is explained, and a check list of requirements for good lighting fixtures is provided. Sylvania Electric Products, Inc.

116 Annunciator Systems — The modern concept of the annunciator function is the subject of 32-pp Bulletin 100-A, which covers general information on components of the system, sequences, annunciator cabinets, accessory equipment, engineering data, and NEC requirements. Tells what an annunciator system is and describes its special advantages. Illustrates sequences, and points out functional variations to consider. Flexibility of circuitry is also illustrated and general dimensions shown. Panalarm Products, Inc.

PIPING, VALVES, TRAPS AND ACCESSORIES

117 Welded Steel Pipe — Bulletin WSP-11055 describes and illustrates advantages of welded steel pipe for factory piping, process piping, water supply, sewage disposal, foundation piling and other uses. Eleven advantages are listed and dimensional data and properties given. Also included are data on pressure and other factors. Armco Drainage & Metal Products, Inc.

118 PVC Pipe, Fittings—Illustrated Bulletin PE-40, 12 pp, gives physical properties, uses and specified dimensions of manufacturer's polyvinyl chloride pipe and fittings. Provides data on chemical resistance, plumbing and installation of this rigid, opaque thermoplastic piping for use in handling high-corrosive, moderate temperature liquids. Corning Glass Works.

119 For Tighter Sewers—Titled, "Transite Sewer Pipe with Ring-Tite Coupling," this 8-pp booklet illustrates and explains economies this asbestos-cement pipe can effect in the design, installation, operation and maintenance of a sewer system. Shows how the coupling makes tight joints quickly. Covers such related items as fittings for connecting to building sewer lines. Includes tables of sizes, weights, crushing strengths. Johns-Manville.

120 Diaphragm Valve—Design and operation advantages of company's diaphragm valve with straight-through flow are outlined in this illustrated bulletin. Cutaway view illustrates simplicity of design and charts indicate fractional resistance to flow of water. Table of dimensions is included. Grinnell Co., Inc.

121 Vacuum Valves—Bulletin 401 describes bronze, cast iron, and fabricated steel bellows-sealed vacuum valves. Includes engineering drawings, cutaway and exploded views of the valves, and dimension charts. Kinney Div., The New York Air Brake Co.

122 Steam Trap Selector—Twelve-pp Bulletin T-9 is designed specifically to aid in the selection and application of steam traps on chemical processing equipment. Features a fold-out piping diagram for 22 pieces of typical processing equipment—each showing recommended steam trap and piping arrangements. Also contains steam trap selector tables. Yarnall-Waring Co.

123 Pipe Unions—Design and construction advantages of Dart unions are featured in illustrated Bulletin D-255. Sectional view points out important details, and specifications and list prices are given. The Fairbanks Co.

124 Unions and Fittings—Catalog 200, 28 pp, presents a broad line of adapter unions, pipe fittings and boss and bulkhead adapter unions. Complete with photos, dimensional diagrams and engineering aids, catalog provides full ordering information and application suggestions. Anchor Coupling Co., Inc.

Reader Service Cards for ordering bulletins are on pages 201-202. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

125 Expansion Joints—Data Sheet Wd introduces a line of expansion joints engineered to accommodate expansion in long pipelines of pneumatic materials handling systems. Advantages offered are covered. Perspective and cutaway drawings, information on application, construction and installation are included, also dimensional data. The Allen-Sherman-Hoff Co.

126 Seamless Fittings — Six-pp Bulletin FB-500, furnishes in concise form the types and size ranges available for a line of welding fittings and flanges. Includes photos and lists dimensional tolerances. Tubular Products Div., The Babcock & Wilcox Co.

127 Vibration Hangers—High-deflection, heavy-duty vibration hangers for suspended equipment and piping systems are described in Catalog VH-55. Two types are presented: rubber-in-shear type, and steel spring type. Dimensions and specifications, installation instructions are given and company's engineering services described. T. R. Finn & Co., Inc.

CONSTRUCTION

129 Grating, Stair Treads—An illustrated report on usage of steel, aluminum and stainless grating and stair treads is presented in this illustrated folder. Discusses various types of electroforged welded grating, and provides dimensional sketches and data on riveted grating. Also discusses bridge decking and types of anchors suggested for grating installations. A detailed safe load table with conversion fac-

BULLETINS

(Begins on page 21)

tors and panel width constant chart are included. Klemp Metal Grating Corp.

130 **Compartments, Cubicles**—A guide for color planning is featured in the 20-pp 1956 catalog covering this company's line of toilet compartments, shower and dressing rooms, shower units. Chart shows samples of 20 standard colors available in baked-on enamel and porcelain enamel finishes. Fully illustrated, booklet gives information on design and construction features; includes specifications and detailed drawings of typical layouts. Hardware and fittings are shown. The Mills Co.

131 **Floor Drains**—How food plant and other industrial floor drain installations can be simplified with this company's all-purpose drain is told in this bulletin. Describes and pictures drain parts, and provides use and installation details. Drehmann Paving & Flooring Co.

MATERIALS HANDLING

132 **Figuring Truck Costs**—"How to Figure Your Industrial Truck Costs" is an illustrated article covering two important phases of cost investigation: cost of truck ownership and truck operation. Information is offered on methods for lowering operating costs. A cost checklist gives 16 points to be considered. The Elwell-Parker Electric Co.

133 **Fork Lifts**—Both stand-up and sit-down fork lift trucks are shown in Form TB-155. Visibility, easy mounting, convenience of controls and other features are discussed, and specifications included. Attachments for use with these fork lifts are illustrated. Lamson Mobilift Co.

134 **Stacking and Stability**—How high stacking affects fork truck stability is explained in this illustrated article. Subjects discussed include calculation of overturning movement and of required trail weight. Use of the data presented is also explained and pointers for operators are provided. Mercury Mfg. Co.

135 **Industrial Truck**—Job Study 155 tells how the installation of a new materials handling system helped one company to unload trucks in one-sixth the time required by manual methods. Details on fork lift truck with hydraulic roll-off accessory are presented and application photos showing it in operation are included. Towmotor Corp.

136 **Conveyor Facts**—Detailed information, specifications and application data are presented in this 20-pp booklet on roller gravity, wheel, belt, and live-roll conveyors. Fully illustrated, this practical booklet provides a section devoted to calculations and another which shows how to determine proper motor size for these conveyors. Lamson Corp.

137 **Wire Rope and Chain Fittings**—Profusely illustrated, Catalog 950-I, 28-pp, describes fittings for wire rope and chain and includes engineering data and charts for each of the many types. Complete information on dimensions and safety factors for links, rings, shackles, swivels, hooks, turnbuckles, thimbles, clips, sockets, ring bolts, eyes and load binders is included. The Thomas Laughlin Div., American Hoist & Derrick Co.

138 **Talc Conveying System**—Reprint GDM-28 is a technical article covering an expanded conveying system at a talc plant. Explains how the Fuller-Kinyon system was expanded to keep pace with increased production, and how plant storage facilities for finished talc were increased. The talc manufacturing process is also explained. Photos and a schematic drawing illustrate text. Fuller Co.

139 **Portable Puller**—Bulletin 146-G, 6-pp, features the CM Puller—a lightweight, portable device with a variety of uses for miscellaneous lifting and pulling jobs. Illustrates and describes various models which are available in capacities from ½ to 6 tons. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

140 **Freight Car Handling**—Results of field tests on company's heavy-duty Trackmobile are detailed in this illustrated 6-pp folder. Tests performed under actual operating conditions in major plants representing a wide cross-section of industry, such as steel, papermaking, and metal fabrication point out machine's versatility. Whiting Corp.

PAINTS, COATINGS

141 **Protective Coatings**—Corrosion control in the operating plant is the subject of this bulletin, which outlines several corrosion-resistant coatings systems for buildings and equipment, structural steel, towers and columns, tanks and piping. Properties and uses are given and basic requirements for control of corrosion are detailed. Bulletin also gives data on tank linings. Amercoat Corp.

142 **Guide to Maintenance Products**—Catalog 56, 48 pp, on industrial maintenance paint products lists specialized coatings to resist alkalies, acids, oils, grease, moisture. A complete buyers' guide, this book includes, besides maintenance coatings, waterproofings, roof coatings, caulking compounds, floor patching materials. Gives technical information on paints for wet walls in food processing plant; epoxy resin coatings offering high resistance to strong acids and chemical salts; a rust inhibitive paint for iron and steel surfaces and a fast-drying floor coating. Covers a full line of paints, enamels, varnishes, coatings and water repellents. Steelcote Mfg. Co.

143 **Metal Paint**—Versatility of Nubelite, a custom-formulated industrial paint finish for use on metal products is highlighted in this 20-pp brochure. Shows a wide range of Nubelite-finished products and lists outstanding qualities of the paint. Also covers research, formulation and other laboratory operations used in the development of these custom finishes. The Glidden Co.

INSTRUMENTS, CONTROLS

144 **Industrial Instruments**—This 8-pp bulletin provides a brief description of each of this manufacturer's industrial instruments, giving features and suggested applications. Covers pyrometers, thermometers, thermocouples; air velocity meters; dewpoint indicators. Includes photos of all instruments. Illinois Testing Laboratories, Inc.

145 **Process Scanning, Logging**—How integration of process control with process scanning and logging is accomplished in the Trans Scan Log control system is detailed in illustrated 16-pp Bulletin 98268. Discusses advantages, tells how the system operates, and illustrates typical "off-normal" sequence. A schematic diagram of complete system is included, along with pertinent specifications. Taylor Instrument Companies.

You'll save time in ordering Bulletins by using the Reader Service Cards provided on pages 201-202. Of course, we honor letterhead requests—but it takes us a bit longer to handle them.

146 **Liquid Level Transmitter**—Eight-pp Bulletin 13-22 describes closed tank liquid level measurement and control with the Type 13 LA d/p cell liquid level transmitter. Diagrams show operation principle and suggested installation layout, with specifications and dimensions listed. Other liquid level components such as indicators, recorders and control valves are shown. The Foxboro Co.

147 **For High Temperature Control**—Bulletin PT 556 contains descriptive data, specifications and dimensions on company's Type P2T photoelectric pyrometer designed to provide greater flexibility in measurement of automatic high temperature control. Explains how pyrometer indicates temperature changes on a meter and provides relay action to give a signal or to control heating devices. Photoswitch Div., Electronics Corp. of America.

149 **Air Meter**—Bulletin 55 describes the pushbutton Anemotherm—a self-contained, portable unit for measuring air velocity, air temperature and static pressure in heating, ventilating and air conditioning systems. Explains operation and describes typical uses in various type of systems. A number of photos illustrate control features and outline operating procedures. Anemostat Corp. of America.

150 **Solenoid Pilot**—Several types of solenoid pilot for use with company's regulating valves are described in Form 1010. Lists reasons for economies in on-off control, describes applications, and gives type of pilot, material of construction, maximum pressure and maximum temperature for two and three-way pilots in steam, air, gas and liquid service. Schematic diagrams of typical applications are given. Spence Engineering Co., Inc.

WATER CONDITIONING

151 **Cooling Water Treatment**—Process Bulletin C1 describes company's treatment for cooling tower systems: synergized polyphosphates plus low pH. Explains how synergized polyphosphates and lower pH conditions prevent scale, corrosion and wood rot as well as cutting maintenance costs and downtime. National Aluminate Corp.

152 **Feedwater Treatment**—Process Bulletin B1, "Treatment of Boiler Feedwater by the Direct, or Internal Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical and complete, and points out how it improves steam quality and reduces boiler maintenance costs and downtime. National Aluminate Corp.

153 **Water Softeners**—Cutaway drawings in Bulletin MSP-123 illustrate construction of company's water softeners, and indicate simple connections by which a softener is fitted into a water system. Capacities of the various models are given, together with other specifications. Hagan Corp.

154 **Feedwater Heater**—New design features incorporating improved operating principles for deaerating feedwater heaters are described in Bulletin 614. A cutaway drawing of a vertical deaerating heater and several installation photos are included, along with selection charts for vertical and horizontal heaters. Elgin Softener Corp.

METALS

155 **Nickel Plated Steel**—This 12-pp technical manual on lectro-clad nickel-plated steel covers manufacturing techniques and fabrication procedures, including forming, welding, cleaning, handling and testing methods. Includes photos, tabulated technical data, chemical and physical specifications, and tentative specifications for nickel-plated steel plates and sheets. The Colorado Fuel & Iron Corp.

156 **Colored Anodized Aluminum**—Colors for anodized aluminum that resist fading from sunlight and outdoor exposure are shown in this brochure, which describes anodizing, dyeing and sealing procedures for obtaining maximum light fastness. Designed as a service to metal finishing and related industries, brochure includes samples of five colors found most suitable for outdoor use. Sandoz Chemical Works, Inc.

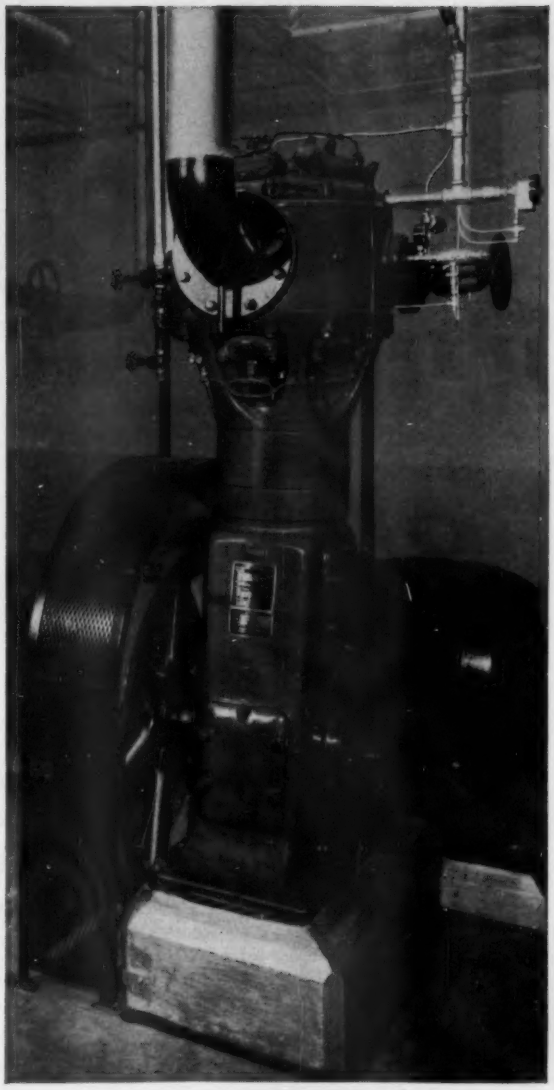
157 **Aluminum Casting**—"How to Melt and Cast Aluminum Alloys," 8 pp, is an article prepared because most casting problems are believed to result from improper melting and casting practices. Illustrated. Article covers pouring temperatures, minimizing drossing, degassing the metal, avoidance of air entrapment, other aspects of casting. The George Sall Metals Co., Inc.

158 **Nickel Plating Process**—The 16-pp third issue of company's booklet on Sulfamate nickel plating tells how this versatile process can produce nickel deposits with variations of stress, hardness, tensile strength, elongation, ductility and electrical resistivity properties. Describes solution preparation; effects of constituents; effective temperatures, current densities and voltage requirements; purification methods; equipment and materials; analytical procedures for four constituents. Hanson-Van Winkle-Munning Co.

(More Bulletins on page 203)

OIL-FREE AIR?

You'll be three steps ahead with the JOY WGO-9 COMPRESSOR



1 **VERTICAL DESIGN**—Saves floor space, allows simple installation. Prevents uneven wear in carbon rings. Eliminates necessity for periodic turning of piston to equalize ring wear.

2 **LONG-ROD CONSTRUCTION**—Spacer between crankcase and cylinder absolutely prevents passage of oil into cylinder. No part of the piston rod that enters the crankcase can enter the cylinder. No possibility of air contamination.

3 **SECTIONALIZED CARBON RINGS**—Expanders maintain ring-contact with cylinder wall despite wear. Rings last longer.

The Joy WGO-9 "long-rod" compressor is the result of more than twenty years' experience in the design and manufacture of non-lubricated compressors. In addition to the carbon graphite piston rings that need no lubrication, the Joy WGO-9 features special lightweight pistons; large, direct air passages; and liberal waterjacketing to reduce heat and minimize ring wear.

The patented Dual-Cushion Valves are made of corrosion-resistant materials. In addition, all metallic wearing surfaces are either chrome-plated, surface-hardened, or made of stainless steel.

Free Bulletin gives details on the Joy WGO-9 Oil-Free Compressor. Write for your copy TODAY to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 57-15

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for VANEAXIAL FANS • COMPRESSORS • OXYGEN GENERATORS VACUUM PUMPS AND BOOSTERS

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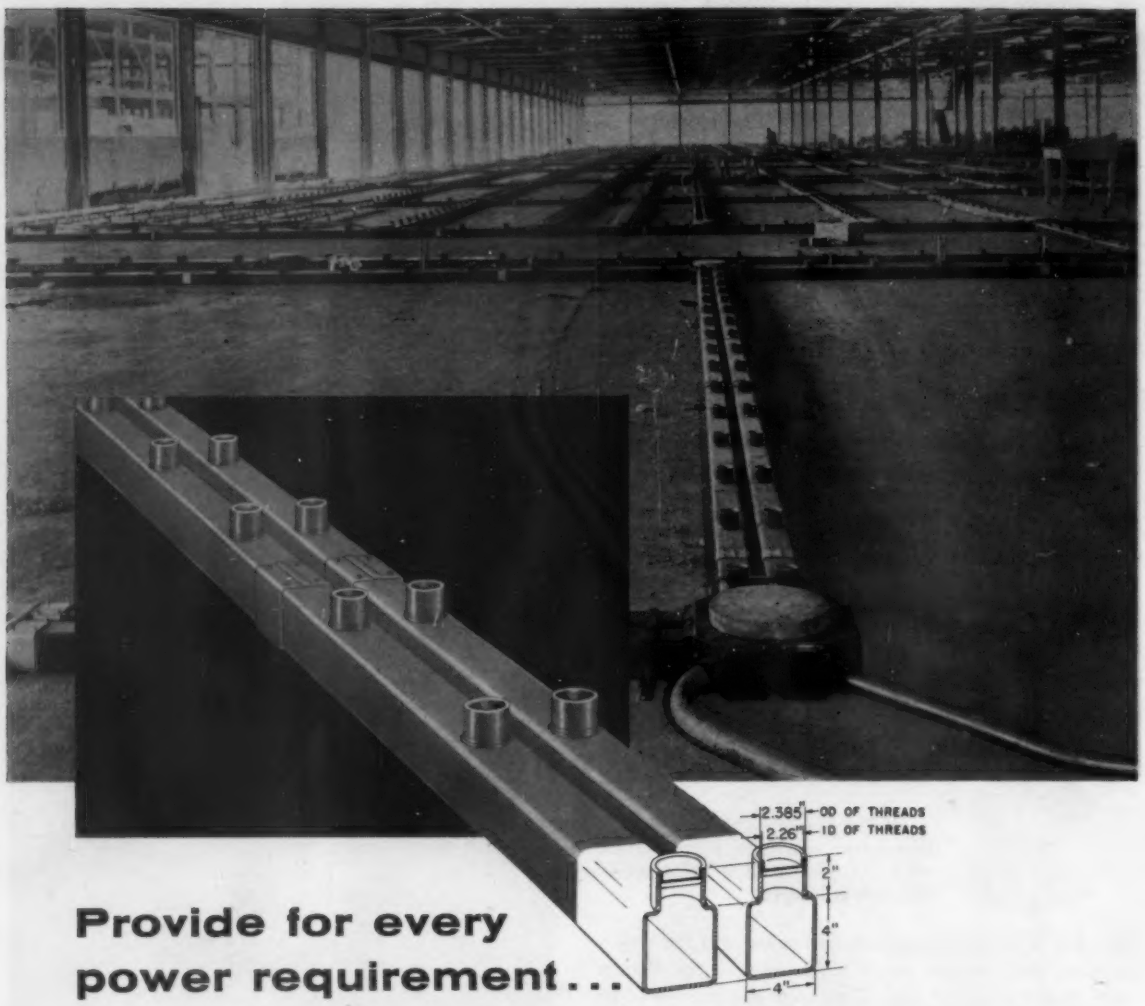
SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

For more facts circle 515 on Reply Card



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Versatile in design, National Electric Jumboduct offers plenty of capacity for production line wiring . . . eliminates the hazard of overhead wiring . . . permits flexible, attractive plant layouts by providing for readily accessible electrical distribution in the floor at a minimum cost.

A Jumboduct system in your plant means:

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4" x 4" Cross Section—more room for wires

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2" pipe threaded outlets every 24" permits exact location of equipment

Low Cost

- Easy-to-handle 10′ lengths
- Same simple installation procedure as standard Nepcoduct
- Quick access to inserts
- Investment in conductors limited to today's needs with ample space for tomorrow's additions

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- Protected against corrosion by Sherardizing
- Coated with a baked-on acid-resisting enamel
- A completely grounded all-steel system

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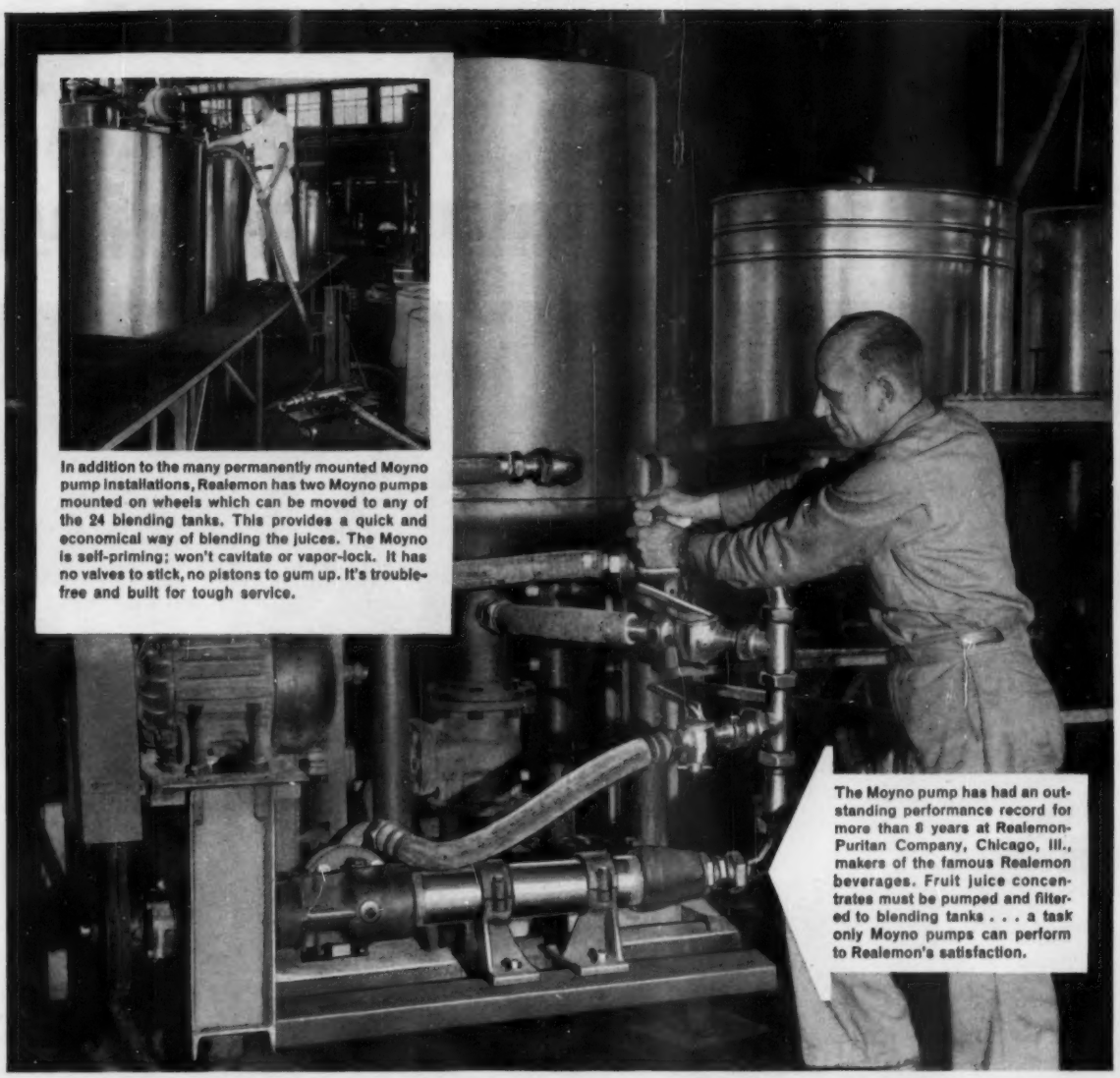


In addition to the many permanently mounted Moyno pump installations, Realemon has two Moyno pumps mounted on wheels which can be moved to any of the 24 blending tanks. This provides a quick and economical way of blending the juices. The Moyno is self-priming; won't cavitate or vapor-lock. It has no valves to stick, no pistons to gum up. It's trouble-free and built for tough service.

The Moyno pump has had an outstanding performance record for more than 8 years at Realemon-Puritan Company, Chicago, Ill., makers of the famous Realemon beverages. Fruit juice concentrates must be pumped and filtered to blending tanks . . . a task only Moyno pumps can perform to Realemon's satisfaction.

Moyno® Pump exclusive choice of Realemon engineers for pumping juice concentrates

In the preparation of many of the famous Realemon products, concentrated fruit juices often must be pumped and filtered to blending tanks.

Pumps formerly used to handle this exacting process wore out completely in a few months because of their inability to stand up under the high acids in citrus juice concentrates.

Realemon then changed to the Moyno pump. Its unique rotor and stator arrangement forms sealed progressing cavities that move the material and provide positive displacement. For this Realemon application, Moynos with chrome-plated rotors and synthetic rubber stators were selected, to assure trouble-free service and long pump life.

Moyno pumps have now been in operation at Realemon for more than eight years, with an outstanding performance record. The only maintenance required is simply to replace the rotor and stator about once a year.

Moynos regularly handle a wide variety of products that other types of pumps can't handle—products such as potato salad, chow mein, fruit, alkalis, pastes, paints, tar —even cement and plaster.

Perhaps the Moyno will solve your pumping problems, too. Write us today for complete information. Ask for a free copy of Bulletin 30-PE.

ROBBINS & MYERS, INC.

MOYNO PUMP DIVISION

Springfield, Ohio
Brantford, Ontario

For more facts circle 517 on Reply Card

OFF CENTER WEIGHT--

didn't damage bearings

...RUN AT FULL SPEED- in this R&M motor!

They're still in perfect condition because they're ***extra large***

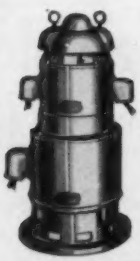
No motor bearing was ever submitted to a tougher test! We mounted a five-pound weight—2 inches off-center—on the shaft of a standard R & M "All-Weather" Motor, then turned on the switch. As you can imagine, that motor practically turned handsprings with over 1,000 pounds of centrifugal force being placed on the bearings. It must be recognized also that this is all side-strain on the bearings. After twelve solid hours of this punishment, the R & M bearings were found to be in perfect condition!

Here's a dramatic example that shows how extra-large, fully sealed R & M bearings pay off in rugged service. By "extra large" we mean bigger diameter than you usually find in a motor bearing... double-row race width... bigger balls that withstand greater load.

You'd never treat a motor this way, of course. But, *in terms of years of service*, a bearing with stamina like this is a bearing you can *forget*. We build oversize bearings into all R & M "All-Weather" Motors—*at no extra cost to you*—as just one more precaution against any chance of failure later on.

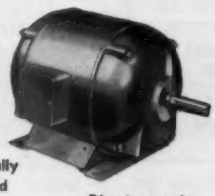
From 1 to 200 Horsepower...

if it's an R & M, it's the Right Motor!

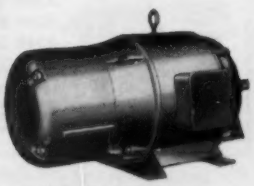


Frequency converters and alternators, 2½ to 15 kw.

Explosion-proof totally enclosed fan-cooled 1 to 40 hp.



Direct current motors 1 to 7½ hp.



Capacitor single-phase motors 1 to 15 hp.

ROBBINS & MYERS, INC.

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Mail the coupon today—for more information on the finest motor your money can buy!

Robbins & Myers, Inc.
Springfield, Ohio

PE

Please send illustrated Integral Horsepower Motor Catalog, showing all the extra features of R & M "All-Weather" Motors that are furnished at a standard motor price. We are also interested in:

- ☐ Explosion-Proof Motors
- ☐ Totally Enclosed Fan-Cooled Motors
- ☐ Capacitor Single-Phase Motors
- ☐ Frequency Converters & Alternators

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

"All-Weather" is an R & M trademark

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"THIS LUBRICANT CUT BEARING REPLACEMENTS OVER 40%"

says—HANOVER BUILDING SUPPLY CO. of Hanover, Pa.

"Before using LUBRIPLATE, we replaced the wheel bearings in over 50% of our trucks each year. Since using it, bearing replacements have dropped to less than 10%. We have also been able to increase periods between chassis lubrications from 500 to 2000 miles. We are very happy over our change to LUBRIPLATE, and heartily recommend it to fleet operators interested in saving money."

HANOVER BUILDING SUPPLY CO.
C. O. Albright, Pres.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

LUBRIPLATE LUBRICATION

MAKES CARS AND TRUCKS RUN BETTER AND LAST LONGER

LUBRIPLATE H.D.S. MOTOR OIL . . . THE OIL THAT NEEDS NO ADDITIVES

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

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BACKTALK about our past issues

Edited by Marjorie E. Weissman

Maintenance Shop Design

PLANT ENGINEERING:

"We are a small chemical manufacturing company in the process of designing a new maintenance shop. This shop would consist of sections for a machine shop, an electric shop, a carpenter shop, a paint shop and a millwright shop.

"We would appreciate any information or recommendation of books or booklets on the design of maintenance shops including equipment arrangement." *W. J. Smith, Jr., Engineering Dept., Virginia Smelting Company, West Norfolk, Va.*

► Perhaps you will be able to get some suggestions from the following books: "Plant Layout Planning and Practice," by Randolph W. Mallick and Armand T. Gaudreau, published by John Wiley & Sons, New York; and "Practical Plant Layout," by Richard Muther, published by McGraw-Hill Book Company, Inc., New York.

Other plant engineers who have encountered problems similar to those of Mr. Smith may be able to offer him some helpful suggestions.—*Editors.*

Who Makes It?

PLANT ENGINEERING:

"On page 101 of your August, 1955 issue there is a one-page article with pictures on jobs that can be done with the Sky-Worker.

"We would appreciate receiving the name and address of the manufacturer of this piece of equipment.

"Please send the reply to the attention of our Mr. J. L. Henneberry, Plant Engineer." *James E. Denney, Warden, Illinois State Penitentiary, Pontiac Branch, Pontiac, Illinois.*

► This equipment is made by the Maxwell Equipment Co., Ford Street, Milford, Connecticut. We have notified Mr. John S. McConnell of this company of your interest in obtaining additional information.—*Editors.*

Floors Versus Acid

PLANT ENGINEERING:

"I would appreciate any additional information you can give me with reference to an article in the November issue of PLANT ENGINEERING, page 106, entitled 'Acid Attacks Stymied.'

"I have a severe problem in one plant where some sections of two large floors are subject to acid corrosion. A number of oxidizing acids, including hydrofluoric, are spilled on the floor, and I have found nothing to withstand this abuse. Trucking is not heavy and is limited to moving in a full drum (not over 600 lb on four 10- by 4-in. wheels), and foot traffic.

"The material described in the article states that it is not effective against oxidizing acids. Perhaps you have some recommendations for my particular problem." *Alden J. Hiern, Richmond, Va.*

► Perhaps some of our readers have encountered a problem similar to that of Mr. Hiern, and could offer him some assistance. Meanwhile, we are sending a copy of Mr. Hiern's letter to the Jameson Chemical Company, 154 East Erie St., Chicago 11, Ill., manufacturer of the floor coating so that they can pass along to you any further information which would be helpful.—*Editors.*

South Africa Calling

PLANT ENGINEERING:

"Please let us have more information on the Solids Pump described on page 111 of the July issue as it appears to be something we could use to advantage in the discharge of waste tannery effluent.

"Any specialized information on the handling of tannery waste such as fleshings, sludge from pits and tanning liquors, would be most helpful.

"This organization has been subscribing to PLANT ENGINEERING for quite some time and we consider the contents to be well worth the cost." *H. M. McGinn, Chief Engineer, Bagshaw, Gibaud & Co., Ltd., Port Elizabeth, Cape Colony, South Africa.*

► We have forwarded your name to the Western Machinery Company, San Francisco, Calif., asking them to send you the information you request.—*Editors.*

Sludge Treatment

PLANT ENGINEERING:

"Your September, 1955 issue carried an interesting article by Howard K. Fitting, titled 'SPS Halves Waste Disposal Costs—New Treatment Cuts Sludge Volume 55 Per Cent.'

"I would like to take issue with the subheading which states: 'process changes to replace gaseous chlorine with liquid sodium hypochlorite cut the sludge (and the problem) 55 per cent.'

"While the subheading and introductory paragraphs of the article state that the sludge volume depends on the form in which the chlorine is applied and that this process change results in a decrease in the sludge volume, a careful perusal of the article fails to substantiate such a claim. Instead the article shows the de-

BETZ • *A Great Name*
In Water Conditioning

"Prescriptions" by the truckload!

Solving industrial water conditioning problems effectively and *economically* requires exacting engineering techniques.

There are no stock answers . . . no stock chemical treatments.

We realize this perhaps more than anyone. In fact, we make a business of it.

For example, each year at our mixing and formulating plants in Pennsylvania, Texas, California, and Quebec, we blend and ship thousands upon thousands of different "prescriptions", each specifically job-engineered to solve some individual water conditioning problem for industry. Because we feel it is so important to "tailor-make" our formulations, each of our plants actually performs the function of a giant industrial pharmacy.

The blending and shipment of our chemical formulations is, however, only one important part of our *completely-individualized* water conditioning service. Individual investigations, plant control methods, daily testing programs, periodic checkups, analyses of water samples, and regular engineering reports all combine to provide a water conditioning service that is complete in every detail.

The end result of individual attention to individual problems is obvious . . . the assurance of a plant (perhaps your own) operating at peak efficiency, free from water problems.

A 20-minute, no obligation discussion of your plant water problems with a Betz District Engineer is the best investment in time you can make. Call him in today.

W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: BETZ Laboratories Limited, Montreal 1.

BETZ

■ CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

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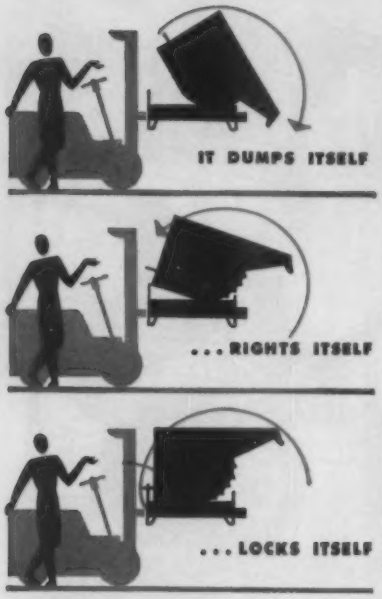

and lives a long and useful life

Not only do Roura Self-Dumping Hoppers cut handling and unloading costs of wet or dry, hot or cold bulky materials 50% or more . . . they do it year after year with little maintenance or repair. That's because Roura Self-Dumping Hoppers are engineered to take "hard knocks" . . . extra heavy gauge metal . . . sturdy arc-welded joints . . . perfect balance for smooth and rhythmic operation.

The rugged Roura gives you simple one-man semi-automatic operation. Models to fit any standard fork or platform lift truck. Also available mounted on live skids, or with malleable or rubber tired wheels or casters. Sizes range from ½ to 2 cubic yards.

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WANT MORE DETAILS on how you can save money with Roura? Just clip this coupon . . . attach it to your letterhead . . . sign your name . . . and mail to

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1413 Woodland Ave., Detroit 11, Michigan

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BACKTALK

crease in sludge volume is due to other changes in the process treatment. The only relationship of the change from gaseous chlorine to hypochlorite in respect to the real reason for a decrease in sludge volume was one of timing; that is, the change in chlorine was merely coincidental with the change that caused the sludge volume to decrease.

"Therefore, a proper analysis of the case, with the evidence available in the article, shows that the sludge volume was reduced, not because the process change was from gaseous chlorine and caustic to hypochlorite, but because the order of chemical treatment was changed in relation to chlorination.

"It would appear that the author's analysis of the cause for decrease in sludge volume is certainly to be questioned, and I thought it best to point this out to your readers." *N. S. Chamberlin, Industrial Consultant, Wallace & Tiernan Inc., Belleville, N. J.*

▶ Thank you for your comments on this article. We are happy to pass them on to the reader.—*Editors.*

Thank You, Mr. Secretary

PLANT ENGINEERING:

"Secretary of Labor Mitchell has asked me to thank you for your helpfulness in sending him a tear sheet from the December issue of PLANT ENGINEERING. He read the story with interest.

"We want to express our appreciation to you for the way in which you have called to the attention of your readers significant developments in the field of industrial training.

"The prominence which you gave to the story of Mr. Erhard's talk will constitute an effective reminder of the importance of training to present day problems." *W. F. Patterson, Director U. S. Department of Labor, Bureau of Apprenticeship, Washington 25, D. C.*

Curtain Walls in Demand

PLANT ENGINEERING:

"Please send me a copy of the report on curtain wall construction as prepared by Princeton University's School of Architecture and referred to in the November, 1955, issue of PLANT ENGINEERING.

"May I say in passing that I have enjoyed receiving your magazine over the past couple of years and have obtained as much valuable information in my line of work as I have from the 'trade' magazines which I receive regularly." *Charles A. Miller, Principal Architectural Engineer, Blaw-Knox Company, Chemical Plants Division, Pittsburgh, Pa.*

PLANT ENGINEERING:

"I have read with interest your brief article on curtain walls in the November '55 issue of PLANT ENGINEERING and would appreciate receiving a copy of the complete report.

"My congratulations to you on publishing a most readable magazine for busy people." *Irvin C. Sanders, Chief, Heat, Light and Power Section, The Glenn L. Martin Company, Baltimore, Md.*

▶ Occasionally, like that of the Gilbertian policemen, an editor's lot is not a happy one, so along with the copies of the report, we are sending you our thanks for those nice words.—*Editors.*

Fundamental Coverage

PLANT ENGINEERING:

"Our engineering department looks forward to the 'Construction Briefs' presented in your magazine. Although every effort has been made to save these articles, there have been times when the magazines were taken from the office before the articles could be removed.

"I would be very pleased to obtain two sets of reprints of 'Construction Briefs' from as many past issues as possible, since these articles provide the finest review of fundamentals that I have seen." *E. A. Zywiec, Assistant to Chief Engineer, Michigan Seamless Tube Company, South Lyon, Mich.*

▶ Thank you for your comments about our 'Construction Briefs' series. We are glad to know that this review of fundamentals is serving the purpose for which it was intended.

Quite some time ago we completely exhausted our supply of tear sheets of these articles, and had them reprinted in booklet form. Two booklets are available—one covering 1953-1954 Briefs, the other, 1954-1955 Briefs, at $0.50 each.—*Editors.*

Zipped Up Caustic Soda?

PLANT ENGINEERING:

"In the December, 1955, issue of PLANT ENGINEERING, you published an article on zipper conveyors used at the B. F. Goodrich plant and at American Cyanamid.

"Can you tell me the name of the manufacturer of this type of conveyor? We believe that it may have an application in our plant for conveying caustic soda and sodium bisulfate." *Donald A. Scholz, Sales Promotion Manager, Boyer Chemical Company, Chicago, Ill.*

▶ The zipper conveyors mentioned in our article are manufactured by the Stephens-Adamson Manufacturing Company, 274 Ridgeway Ave., Aurora, Ill. We are notifying them of your interest in the possible use of this type of conveyor for carrying caustic soda and sodium bisulfate.—*Editors.*

Keep high-voltage circuits operating **despite heat and oxidation**

Many refinery operations are tough on electrical cables. Chemical plants create similar hazards. High temperatures, oxidizing and corrosive fumes, oils, acids, chemicals, moisture, all tend to make circuit trouble.

But you can sharply reduce high-voltage circuit maintenance costs, unnecessary down time, and the expense of frequently replacing wires and cables. The imperviousness of one of our new sheathing materials is your key to these savings.

RoZone®-RoSeal—For circuits rated up to 15 kv

If your high-voltage distribution system must withstand the effects of *heat or corrosive fumes, oils or chemicals, flame or weathering, moisture or burial direct in earth,* Rome RoZone-RoSeal offers you sound protection.

Applied on shielded power cable over the high-quality RoZone insulation, RoSeal is a completely satisfactory and durable non-metallic sheath. It gives you long-time, trouble-free, high-voltage distribution at relatively low cost.

Easy to work with

A boon to maintenance men and electrical contractors alike, RoSeal costs less to install than lead covered cables. Splicing is simpler. It weighs much less, it's tough and resistant to mechanical damage. And the smooth, waxy finish of RoSeal sheathed cable makes it easy to pull.

RoSeal resists oils and most chemicals even better than rugged Neoprene does, an obvious advantage in refineries, paper mills, chemical plants and the like.

Rome application engineers are available *any time* to help you cut your high-voltage distribution costs. Write today for information on Rome RoZone-RoSeal.

Tells Dramatic Story of Cable • CABLE PATHWAY OF POWER. A 45-minute feature film in sound and color, 16mm. Available for showings to technical personnel. Write Rome Cable Corporation, Rome, N. Y., for bookings.

It Costs Less to Buy the Best

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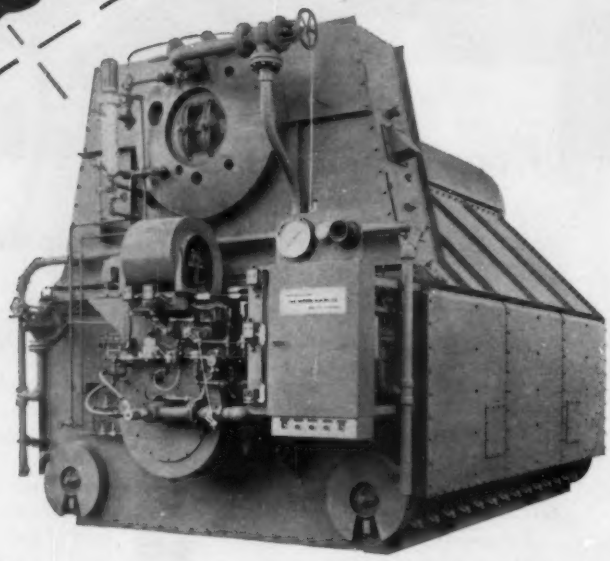
YARWAYS for WICKES



this

package boiler maker

selects

Yarway Blow-Off Valves

The Wickes Boiler Co. selects Yarway Seatless Blow-Off Valves to make their good package-type boiler even *better*.

Most package boiler users insist on Yarways . . . and most boiler manufacturers supply them.

This acceptance is growing fast. *Dependability* and *low maintenance* are two of the reasons. Rugged, safe Yarway Seatless Blow-Off Valves *have no seat to score, wear, clog or leak.*

Yarway Blow-Off Valves are used today in over 16,000 boiler plants. Many of these valves have been in *continuous* service 20, 30 and 40 years.

For the full story on blow-off valves to meet your pressure requirements, write for Yarway Bulletin B-426.

YARNALL-WARING COMPANY

145 Mermaid Avenue, Philadelphia 18, Pa.

BRANCH OFFICES in PRINCIPAL CITIES

YARWAY

BLOW-OFF VALVES

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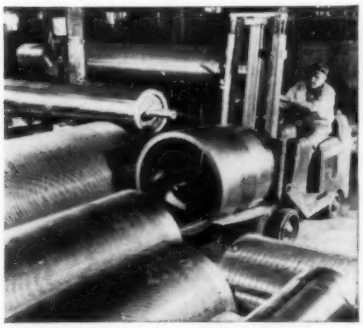
B.F.Goodrich
industrial tire quiz

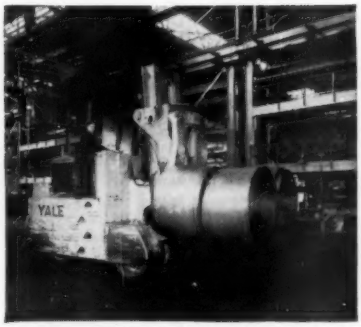
1 Here the job is stacking materials for storage in a warehouse with a 2,000 to 3,000-pound lift truck.

What are the right tires to use on these jobs?

2 This wheelbarrow hauls sand, dirt, brick, stone and the like at a construction site.



3 This unit moves materials in a factory. Loads are not fragile and hauling conditions present no special problems.



4 The problem in this steel mill is hauling giant loads over floors covered with sharp, abrasive scrap.

5 This job involves work on oily packing-house floors. You'd find the same conditions in a machine shop.

6 Up and down ramps, into and out of trucks—for jobs like this you need all the traction you can get.

7 Truck cranes and straddle trucks that work in the factory yard moving tons of materials need tires like these.

8 Wherever small, light loads must be moved short distances under favorable conditions, you'll find these tires.

HERE ARE THE ANSWERS

B.F.Goodrich

answers your industrial tire problems

All-Purpose Pneumatic

Here is the ideal tire for general hauling work where floors are smooth and aisles unobstructed. The All-Purpose boosts hauling speeds, steps up schedules, cuts time and labor costs. Maintenance to both floor and equipment is reduced. And the rugged B. F. Goodrich tread gives traction when you need it!

Wheelbarrow Express Pneumatic

This B. F. Goodrich tire rolls easier on dirt or uneven floors, absorbs shock and reduces operator fatigue. It cuts costs by cushioning the load and preventing fragile cargo breakage. There's a Wheelbarrow Express for light and medium service as well as heavy work. And B. F. Goodrich also provides wheelbarrow wheels and tire and wheel assemblies.

Pressed-On Smooth Tread

This versatile B. F. Goodrich industrial tire can be used on either traction or free-rolling wheels for general material handling work. Comes in 3 tread compounds: Universal for cutting and chipping problems, Low Power to reduce rolling resistance on electrically-operated equipment, and Oil Proof.

Pressed-On Grooved Tread

This B. F. Goodrich tire is grooved in the larger sizes and comes in three tread compounds. For work in a steel mill, you'd want Universal compound to resist abrasive scrap, and you'd want the flexible grooved tread for easier steering. This tire carries extremely heavy loads in severe service.

Pressed-On Deluxe Cushion Wide Lug

This B. F. Goodrich Pressed-On Deluxe Cushion tire with wide lugs and thick tread cushions like a pneumatic, is non-directional to grip the floor in forward or reverse. Like all solid tires made by B. F. Goodrich, this tire is also available in special oil-proof compound that defies tire-killing oil, gasoline, etc.

Pressed-On Deluxe Cushion Lug

Dock areas, factory yards and irregular floors can quickly destroy pneumatic tires. So to get maximum cushioning and traction without the danger of flat tires, use B. F. Goodrich Pressed-On Deluxe Cushion Lug tires. The tread is bonded to the steel base by a special process that assures positive adhesion and reduces maintenance and repair costs.

Universal Pneumatic

If you use heavy equipment to move giant loads, the B. F. Goodrich Universal pneumatic tire is recommended. Wedge-shaped cleats guard against skidding, pull in either direction. You get maximum load-carrying capacity and flotation. The Universal absorbs shocks, reducing operator fatigue and equipment maintenance.

Zero Pressure

The B. F. Goodrich Zero Pressure is the most economical and practical tire ever developed for light industrial hauling equipment. The tire needs no tube, can't go flat. It rolls easier, gives maximum carrying capacity, toughness and durability. B. F. Goodrich makes Zero Pressures for light, medium and heavy service.

The B. F. Goodrich Company
Tire & Equipment Division
Department TW-557, Akron 18, Ohio

I would like further information on your FREE TW Analysis Plan.

Name _____

Company _____

Street _____

City _____ Zone ____ State ____

How a FREE TW TIRE AND WHEEL ANALYSIS can help you

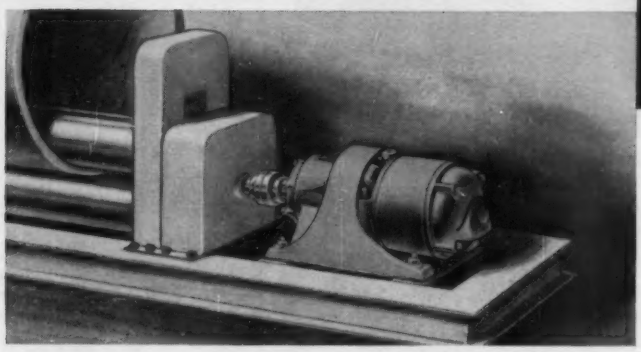
Your B. F. Goodrich Tire and Wheel Analysis man knows which industrial tire will answer every material handling question. He'll gladly make a FREE survey of your operations, then give unbiased advice on the right tires for you to use. Follow his advice and you can save up to 50% on your industrial tires, up to 20% on maintenance costs. Get your equipment on the right tires *now* by mailing the coupon. A consulting service is available to manufacturers of material handling equipment.

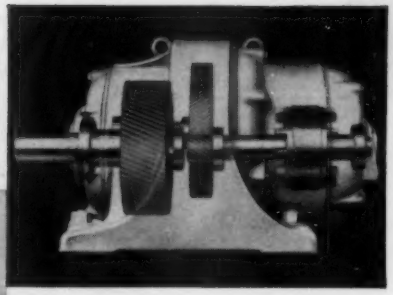
RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Specify B. F. Goodrich tires when ordering new equipment

For more facts circle 524 on Reply Card

Simplify WITH SYNCROGEAR INTERNALLY GEARED POWER

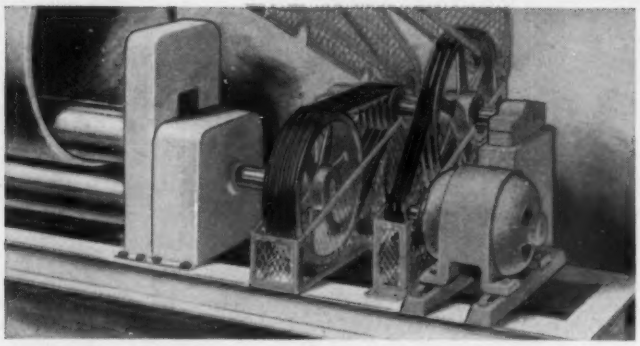


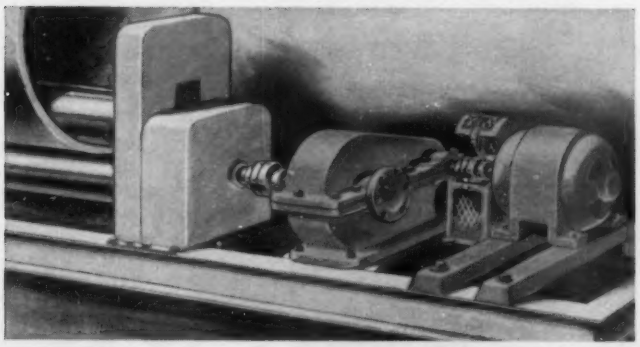


▲
U.S. SYNCROGEAR MOTOR

5 TO 10,000 RPM
½ TO 30 H.P.

Reject CUMBERSOME HOOKUPS





The U. S. Syncrogear is more than a motor. Its "packaged" assembly includes a high speed motor, an enclosed sealed gear-train, correctly engineered for the load, always in exact alignment, all mounted in a single case which saves space and eliminates the ungainly appearance of complicated hookups.

You don't have to calculate chain, sprocket, bearing or shaft requirements, or invest in separate mechanisms, special fabricated guards, extra pulleys and belting when you direct-connect a Syncrogear.

More and more manufacturers are using Syncrogears on their products to improve appearance and increase saleability.

Free—Mail coupon for all new descriptive multicolor booklet with all the facts you should know about geared motors.

U.S. *Electrical* MOTORS

U. S. ELECTRICAL MOTORS Inc. PLE-2
P. O. Box 2058, Los Angeles 54, Calif., or Milford, Conn.
Send Syncrogear Booklet

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COMPANY_____

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CITY_____ ZONE____ STATE_____

For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Hose Flexes to Steamy Job

STEAM HOSE failures on molding presses have been eliminated with the use of resin-jacketed stainless wire braid hose assemblies on batteries of 100-ton French presses at Pro-phy-lac-tic Brush Company, Florence, Mass. Hose on these presses feed steam at 170 psi and 340 F to the ram and bed to keep the mold at a uniform temperature.

Because of the constant flexure to which the hose is subjected by the presses moving up and down in a 50-sec cycle for approximately 22 hours a day, ordinary flexible hose had to be repaired after three months of use. With four or five hoses on each of 20 presses, maintenance work was excessive.

The ordinary hoses were replaced with a smooth, extruded fluorocarbon resin hose jacketed in stainless steel wire braid. Three piece steel couplings were slipped over the hose and swaged directly onto the steel jacket to attach each hose.

Stainless flexible hose carries steam

After three years of use, these assemblies are unaffected by steam or flexure stress, and joints are still tight and leak-free. *From a release for Resistoflex Corporation, Belleville, N. J.*

Handling Aluminum Ingots

CYLINDRICAL aluminum ingots destined for extrusion in a 14,000-ton press are handled in the Lafayette plant of the Aluminum Company of America with a combination of tools including conveyors, racks, a semi-gantry motorized crane and tongs designed especially to lift and transport the ingots.

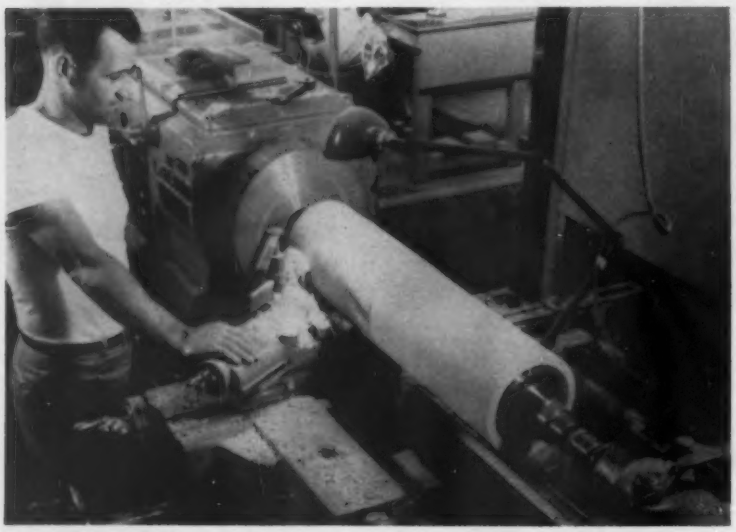
A heavy capacity, overhead crane, serving the 80-ft plant bay into which the ingot conveyor extended, was not

(Continued on page 38)

Plastic-Clad Aluminum For Heavy Duty Pistons

TO WITHSTAND the shocks produced by landing speeds up to 100 mph pistons used in aircraft shock absorbing units must be mechanically strong, shock resistant, impervious to oils and indifferent to sharp temperature changes. The most critical requirement of all is that metal-to-metal contact between piston and cylinder be avoided to prevent the piston "seizing" inside the cylinder due to effect of weather or hydraulic oil on the metals.

To solve this problem, laminated plastics joined forces with aluminum. Developed according to designs produced by the Cleveland Pneumatic Tool Co., the combination consists of specified thicknesses of laminated plastic material permanently bonded to cores of aluminum tubes of various diameters. A series of machining operations converts the laminate-covered tubing to piston head bearings for use in the shock-absorbing units of landing gear.



After bonding laminate cover to aluminum, the cylinder is turned to exact OD

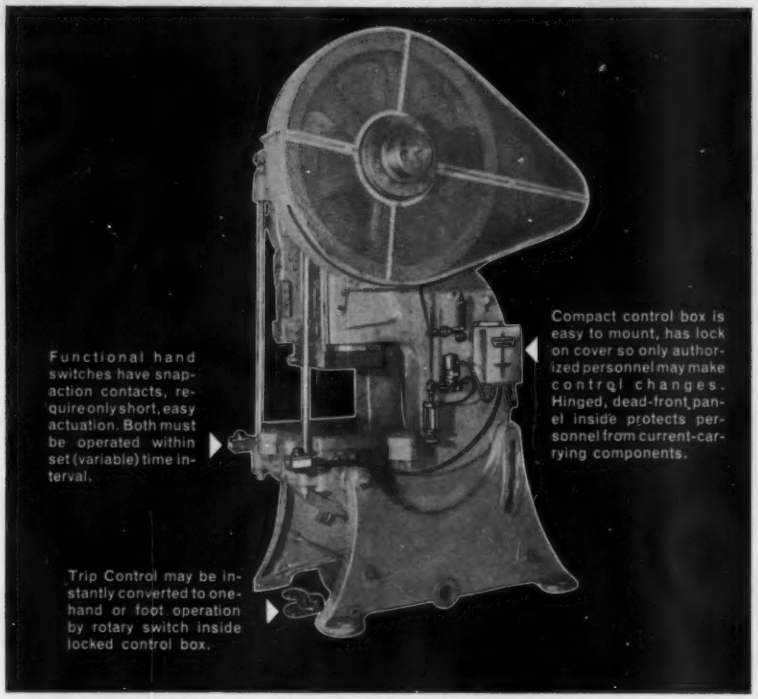
Production of the piston heads begins by knurling a 38-in. long aluminum tube for its entire length. This machining operation produces a roughened surface comprising thousands of tiny ridges and knobs. Ridges provide the necessary anchor for bonding the laminate outer covering to the metal.

The covering itself is a continuous length of specially treated fine-weave cotton fabric impregnated with a phenolic resin. As the fabric passes over heated pressure rollers to be wrapped around the aluminum tube, the resin softens and the chemical process of polymerization takes place, fusing the individual layers into a strong, solid mass that cannot be re-softened or reshaped. When sufficient layers of fabric have been wrapped around the tube to build it up to a point slightly beyond the required wall thickness, the tube is oven-cured to complete polymerization. The laminate wrapper is then machined to the proper outside dimension, following which the tube is cut to specified lengths. More than a dozen machining operations are then performed on the laminate-aluminum combination.

The resulting piston head has an extremely high strength-to-weight ratio, with an ability to resist scoring and the action of hydraulic fluid, and the ability to prevent seizing of the piston. *From a release of Synthane Corporation, Oaks, Pa.*

MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN


Functional hand switches have snap-action contacts, require only short, easy actuation. Both must be operated within set (variable) time interval.
Compact control box is easy to mount, has lock on cover so only authorized personnel may make control changes. Hinged, dead-front panel inside protects personnel from current-carrying components.
Trip Control may be instantly converted to one-hand or foot operation by rotary switch inside locked control box.

Increase production...3 ways... with MICRO SWITCH Trip Controls

MICRO SWITCH Trip Control will speed production and provide safety to the operator and equipment on any power machine that will lend itself to two-hand control.

1 Less operator fatigue: Simple direct operating motions, feather-touch finger-tip operation of the control switches, and the absence of gates, harnesses or sweeps keep the operator fresh and alert.

2 Increased operator confidence: Without worry over personal safety, operators soon develop a smooth, time-saving "load," "trip," and "unload" sequence.

3 Instantaneous electrical actuation of the clutch: Saves time on every operation.

Outstanding safety features

Reduces chance of accidental operation. Operation can result only when control system is functioning properly. The control becomes inoperable if a component fails.

Control cannot be "cheated" for even one stroke: If one switch is tied down or broken, the control will automatically kick out.

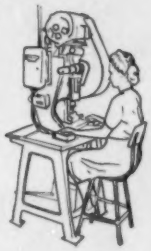
Interlock prevents accidental power stroke during set-up. Operators, set-up men, and expensive dies are protected during set-up. The interlock prevents an unexpected stroke when the motor is started up again.

MICRO SWITCH Trip Controls have wide range of uses

These controls offer a choice of desirable single-stroke control for positive mechanical clutch machines and automatic cycling control for friction clutches and hydraulic and pneumatic equipment.

FOR SMALL PRESSES

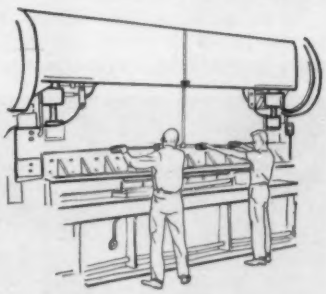
Provides fast, safe, effortless operation of small two-hand presses, riveting machines, etc.



ONE HAND—IF NECESSARY

Where one hand is required to hold stock in a protected or enclosed die, control is quickly converted to one-hand operation.

FOR USE ON LARGE PRESSES



Makes operation of large presses safe and less tiring. Any number of operator stations may be "wired into" the control circuit.

SEND FOR CATALOG 65 TODAY

Gives complete description of all controls and clutch actuating equipment.

There is a MICRO SWITCH Trip Control distributor near you. Write us for his name and address.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

For more facts circle 526 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

Tongs, suspended by wire rope from semi-gantry, carry aluminum ingots from storage to receiving conveyor

considered suitable for handling aircraft component parts weighing more than 1½ tons. Instead a semi-gantry crane was installed to do the work, leaving the overhead crane available for other jobs.

When received, the ingots are stacked in steel racks 10 ft from the receiving end of the conveyor. To move them from the racks to the conveyor, the semi-gantry is positioned over the rack and a pair of tongs attached to a wire rope hoist pick up the topmost ingot. With tongs and load raised, the semi-gantry moves the 10 ft to the conveyor which feeds the manipulator at the heating station serving the press.

As the ingot is laid on the conveyor, the jaws of the tongs, which handle ingots from 15 to 72 in. long, open automatically, and remain locked in this position until another ingot is picked up from the storage rack. *From a release of Heppenstall Company, Pittsburgh, Pa.*

Thermal Expansion Computor Reduces Rejects

REDUCTIONS up to 17 per cent in the number of rejected parts and in scrap, have resulted from a temperature correction process developed and used in metal working operations at our Wright Aeronautical Division. The savings were accomplished with the use of a three-dial, slide-rule type commutor for thermal expansion rates of reciprocating and jet engine parts.

The method is simple and quick to use. Temperature of the master, or gage parts are obtained with a pyrometer, after which the operator takes the gage reading for the part dimension being worked. Based upon the temperature values obtained, and utilizing the applicable temperature correction slide rule, the operator can determine the correction factor to be used to compensate the gage reading for thermal effects. The result is equivalent to the gaged dimension when both part and gage are at the standard measurement of 68 F.

The need for such a computor was shown after it was determined that magnesium and aluminum aircraft parts have greater expansion rates than the steel or gray iron gages or masters used to check them. Due to this, part dimensions inspected under high shop temperatures would differ significantly from the same dimensions gaged at 68 F.

To solve this problem, a method was devised for computing temperature corrections, rather than employing com-

(Continued on page 40)

Portable Unit, Easily Maneuvered, Conveys Bulk Flour from Rail Car to Van

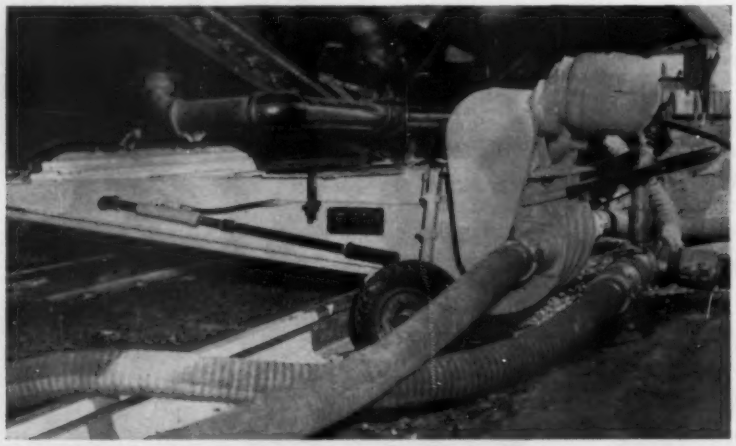
DIRECT TRANSFER of bulk flour from a rail car to a van for delivery to bakeries, is now possible with a portable transfer unit.

Designed for use with an Airslide bulk van, the unit is mounted on two pneumatic-tired wheels and can be maneuvered by one man.

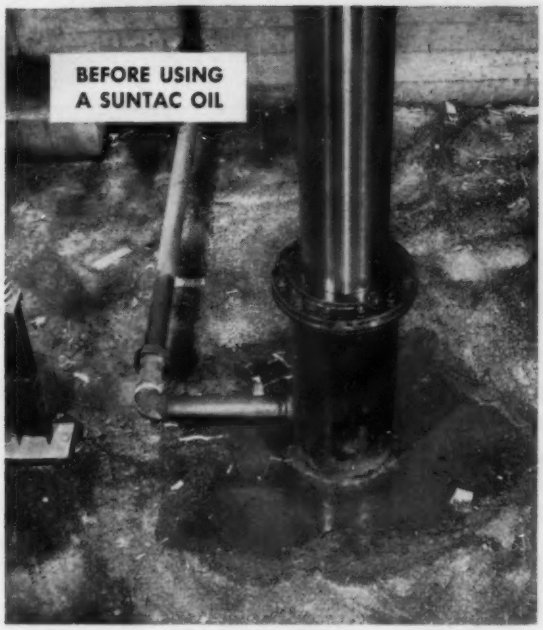
To unload an Airslide rail car, the unit is placed underneath the car so that its two flanged openings correspond to the discharge outlets on the car. A hydraulic system allows the transfer unit to follow the car as it rises on its springs during the unloading operation.

Flour entering the unit from the car is fluidized and flows by gravity down the 8-deg slope of the Airslide and into the rotary blower blow-through feeder where it is picked up in the air stream and conveyed to the bulk van. The main blower on the van furnishes air for conveying the flour. Airslide blowers on the van energize the Airslides in the car and the transfer unit. Air hoses and special hose with a nontoxic liner for conveying the flour, are carried inside the van, as is the power cable. Only extra equipment needed at the rail siding is an electrical outlet. *From a release of Fuller Company, Catasauqua, Pa.*

Self-contained unit for handling bulk flour is seen connected to special van



Portable transfer unit is shown in position underneath rail car. Hydraulic system on unit maintains tight, gasketed seal. It is readily handled by one man



SUNTAC CUTS OIL WASTE, MAINTENANCE COSTS

High quality Suntac oils reduce drip...throw-off...squeeze-out... cut leakage an average of 35% and up to 90% in some cases.

Before using Suntac oil, a prominent eastern manufacturer had to add excessive make-up oil to the hydraulic system of his freight elevator. Oil leakage caused a continual housekeeping problem...the pit had to be cleaned out every six to eight weeks and maintenance costs were high.

Now, one year after switching to a Suntac oil, make-up has been drastically reduced, and frequent pit clean-ups are no longer necessary.

The reason: Suntac oils are specially compounded oils with adhesive-cohesive characteristics that enable them to cling to parts where other oils would drip, throw-off, leak, and squeeze out.

For complete information about Suntac oils, see your Sun representative, or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-2.

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For more facts circle 527 on Reply Card

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 1 ton capacites—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
½ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

Call the CM distributor for descriptive literature, prices and fast delivery from stock.

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COLUMBUS McKINNON CHAIN CORPORATION
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For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

parable material gaging, increased use of refrigerated coolants or air conditioned areas. In addition, the computing method was relatively cheap compared with the other methods.

As a first step toward making the computor, engineering material specifications were classified by material types such as aluminum, bronze and magnesium and the related coefficients of expansion were obtained. An operating procedure for shop application of correction factors was formulated.

Next, gaging policy was formalized and indicating type gages were provided for control of close tolerances on large dimensions. Arithmetic scales were developed in accordance with theoretical expansion relationships with modifications based on trial shop runs. Finally an operating procedure was established using the slide rule type computor and a portable pyrometer.

Seven types of computors, applicable to various metals, have been developed. Five of them are in current use in the plant. *From a release of Curtiss-Wright Corporation, Wood-Ridge, N.J.*

Washing Machines on the Move

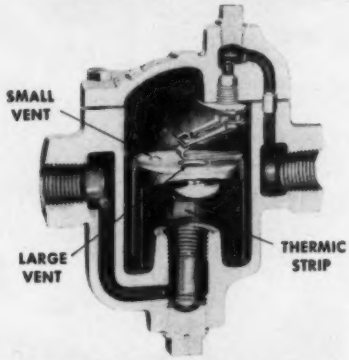
Wide-spread clamp attachments on fork trucks at Whirlpool Corp. Ohio plant make pallet-less transfer of washing machines from conveyor to freight car a fast job. (From a release for Clark Equipment Co., Battle Creek, Mich.)

Accurate Lanyard Loops

LOOPS MADE in steel cable lanyards are quickly measured by means of an adjustable pin attached to the crimping machine. The adjustment between the pin and the crimping die measures the size of the loop.

A preliminary loop is made in the cable, and a sleeve fastener is attached. The latter is positioned in the crimping die, and one end of the cable

The Low Maintenance Trap for Low Pressure Heating . . .



Open Float and Thermostatic Trap

For fast heat-ups, Armstrong steam traps can be fitted with thermic buckets. These are excellent for heating systems that are shut off at night and turned on in the morning. Large opening in the bucket, controlled by a thermic strip, provides a fast discharge of air until steam enters the trap. Heat contracts the strip closing the opening. Non-condensibles that enter with the steam during normal operation are continually discharged through the small vent.

The Armstrong No. 800 trap above is operating at a 10 to 12 pound initial pressure and discharging into a return line carrying 5" of vacuum. In 12 year's service, maintenance costs on this and 99 other Armstrong traps has been practically zero . . . so reports Mr. Thomas B. Healy, Vice President of the Liquid Veneer Corporation.

The reason behind this low cost maintenance lies in the design, workmanship and materials used in the traps. The stainless and chrome steel internal mechanism is identical in design, workmanship and materials to the internal mechanisms of forged steel traps used for 900 lb. pressure and 900°F service. It is no wonder that these traps deliver such long, trouble-free performance operating under the moderate pressures, temperatures and loads of a low pressure vacuum return heating system.

Low maintenance is only one of the reasons Armstrongs are widely used for heating. There are others . . . uniform heating . . . faster heat-ups . . . easy cleaning and inspection . . . guaranteed satisfaction . . . competitively priced . . . backed by a nation wide sales and service organization. Ask your Armstrong Representative for complete details or write:

ARMSTRONG MACHINE WORKS
912 Maple Street, Three Rivers, Michigan

ASK FOR CATALOG J

. . . . . contains complete installation and service information, physical data and prices for all Armstrong traps and accessories.

Application Engineered

ARMSTRONG STEAM TRAPS

For more facts circle 529 on Reply Card

...Why don't they get
WING Revolving Heaters?

Are your workers subjected to steady blasts of heat from suspended unit heaters with fixed discharge outlets? Are some uncomfortably hot while others are just as uncomfortably chilled? Wing Revolving discharge unit heaters are the logical solution to these important personnel problems. The heated air is discharged from slowly revolving outlets and this warm air stream caresses the workers in its circular path for a few seconds at a time, just enough to give a sensation of live, invigorating warmth.

Factories heated by Wing Revolving Heaters are pleasant places to work. Convince yourself—try one.

Write for a copy of Bulletin HR-6A. Use the coupon.

L. J. Wing Mfg. Co. **177 Vreeland Mills Road, Linden, N. J.**

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Please send me Bulletin HR-6A-Revolving Heaters

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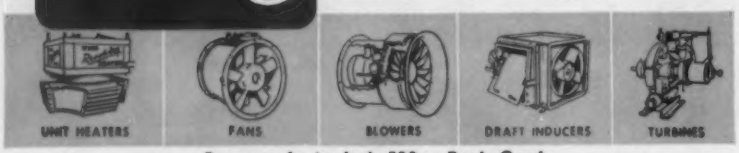
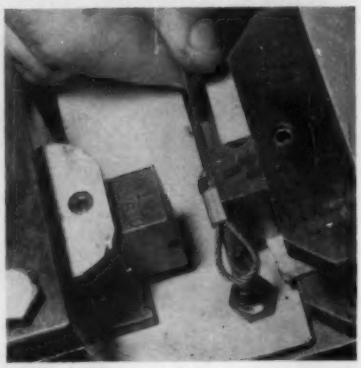


For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)



Adjustable pin on crimping machine makes accurate loop in steel lanyard

is drawn through the sleeve until the loop touches the measuring pin. The sleeve is then crimped, resulting in a precise loop in the lanyard. *From a release of Glenn L. Martin Company, Baltimore, Md.*

Plant Protects Community

ERECTION of a 125,000-gal water tank at our Olean, N. Y. plant has increased friendly company-community relations.

Since the plant and approximately 200 homes in the vicinity are outside

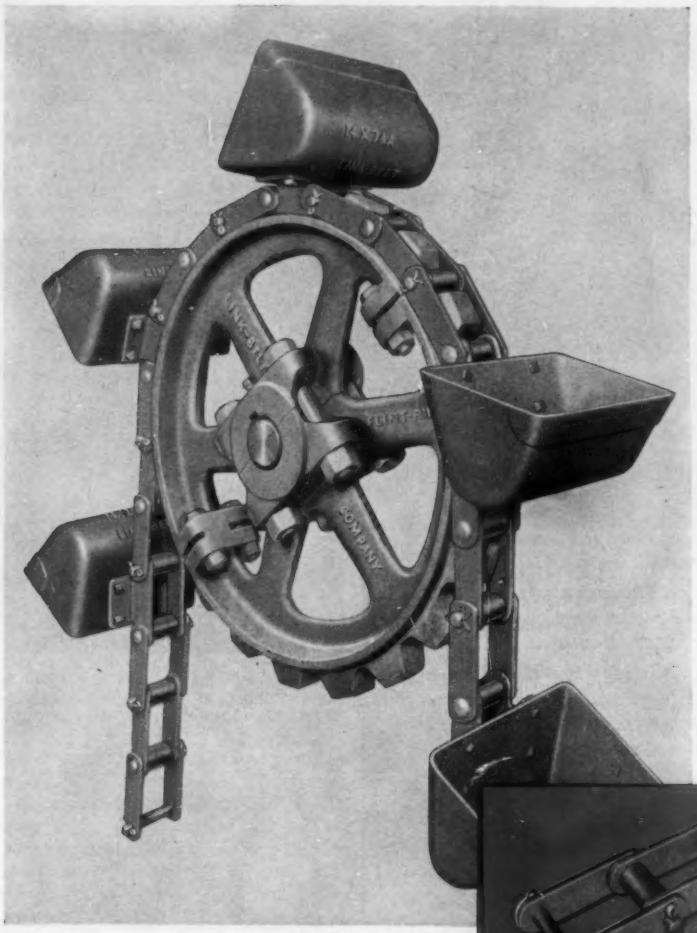
Large tank replaces old one, seen in background, provides emergency water supply for both plant and community

the city limits, the tank provides the only emergency water supply for area. A mile of hose can be run from the hydrant at the base of the water tank to any home, in the event of fire. During its short existence, the tank's water supply helped to save a home adjacent to a burning store.

In addition to the tank, a sprinkler

4 times the life... 1/4 the maintenance

through proper selection of LINK-BELT *chain*



Bucket elevator at fertilizer plant proves advantage of choosing from this complete line

Often there's no need to go to excessively costly cast special alloy chains to get long life. Here's proof: In an Indianapolis fertilizer plant, Link-Belt SS-111 bushed chain (left) handled an average of 75,000 to 80,000 tons of fertilizer before requiring replacement. The previous type of chain had to be replaced after handling 18,000 tons.

This installation is an example of the efficiency and economy that can be gained by applying the one chain best suited to specific conditions from the complete Link-Belt line. Remember, no other single source offers you such a broad range of roller, silent, cast, combination, forged and fabricated chains . . . with matching sprockets.

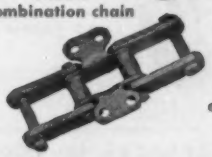
A call to your nearby Link-Belt office or authorized stock-carrying distributor will bring you all the facts about the complete line of Link-Belt chains and sprockets.

Under severely corrosive conditions, Link-Belt SS chain on bucket elevator of this type in fertilizer plant handled 80,000 tons, to previous chain's 18,000.

Looking for the *best* chain for a specific need? Link-Belt makes the *complete* line.

LXS steel chain

Class C combination chain



800 Ley bushed chain

"Flint-Rim" cast sprockets

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,010

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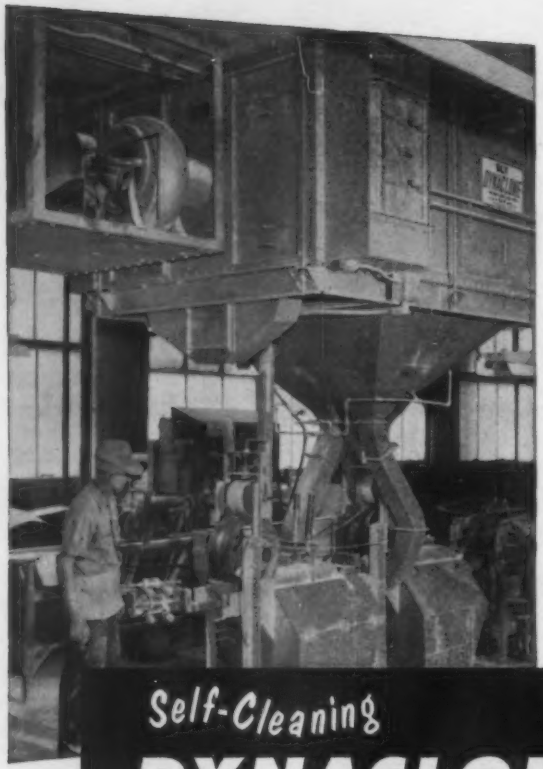


1 OF 4 UNITS AT GOODRICH

Self-Cleaning
DYNACLONE
The Ultimate Dust Collector

No matter how dusty your manufacturing operation, you can effectively control the dust. Take the case of The B. F. Goodrich Company.

This company processes garden hose by passing it through pigment dusting chambers. There are two dusting chambers—shown on the floor below the filter—one for soapstone (talc) and the other for zinc stearate.

Dust-laden air from this operation is drawn through vertical ducts to the Sly Dynaclone two-compartment Filter, above. The dusting compounds are kept separate and are returned to the chambers for re-use and the cleaned air returned to the plant. *No material is wasted—all is used, meaning substantial savings. No cleaning-up operation—always a clean plant!*

Self-cleaning by reverse air, the Sly Dynaclone represents the greatest advance ever made in industrial dust collection. Without added motors or blowers, it maintains a constant, uniform suction at dust sources. No shutdowns, no shaking, no wearing of bags. In use since February, 1951, it has operated continuously—*24 hours a day*. Well pleased, The B. F. Goodrich Company has purchased large Dynaclones for three other plants.

Designers and Manufacturers of: Dust Control Systems, Blast Cleaning Equipment, Tumbling Mills, Industrial Ovens.

THE W. W. SLY MANUFACTURING CO.
SINCE 1874
4600 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

PIONEERS AND LEADERS IN INDUSTRIAL DUST CONTROL

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

system was installed in the plant. Of the water available, 100,000 gal are reserved for this system, the remainder being for general plant use. *From a release of Line Material Company, Milwaukee, Wis.*

Chemically Bonded Silica Brick

ROOF OF an open hearth furnace in a steel mill is serviceable for about 100 "heats," or 50 days. After this, the furnace must be shut down, the brick roof torn out and replaced. This costs the steel industry about one million bricks per day.

A silica brick, produced by Illinois Clay Products Company, Joliet, Ill., made with a phosphoric acid binder, is giving about 25 per cent longer service

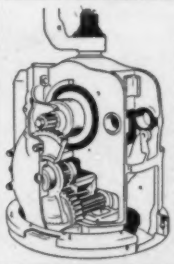
Both of these bricks were subjected to same number of "heats" in furnace. Chemically bonded brick is seen, right

in linings of open hearth furnaces and withstands temperatures from 50 to 100 F higher than standard brick.

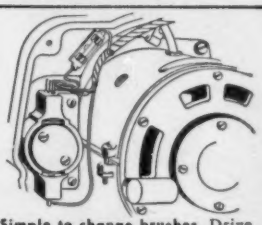
The new brick is made in the same mixers and molds as the standard type. The mix for it consists of the usual silica and lime, plus a special binder made with phosphoric acid. This mixture is stirred in a blender, then pressed in the molds. The wet bricks are transferred to an oven, heated overnight, and can be shipped to a steel mill the following day.

This procedure compares with the conventional method for making silica brick, which, after mixing, is pressed into molds. Wet bricks are then heated gradually in a kiln to 2500 F to fuse the particles of lime and silica. The bricks are then cooled gradually. Complete process occupies about 11 days, since any attempt to speed the process

Only Yale *Worksavers* have these 5 big features for longer trouble-free service

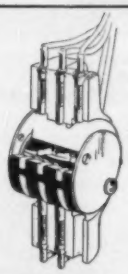


Gears operate in an oil bath—will last the lifetime of the truck. This powerful drive unit is entirely enclosed and floats on 105 ball bearings. Gears are drop-forged nickel-chrome-molybdenum, heat-treated and mounted on heavy duty ball bearings.

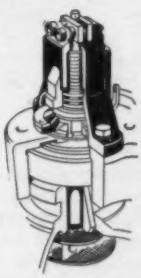


Simple to change brushes. Drive motor is of a high torque series-wound type, specially designed for easy cleaning and adjustment.

Split hub—locks wheel to splined axle—prevents axle wear, provides for quick tire change.



No frayed, broken wires. Flexing, chafing and bending of wires eliminated by slip rings built into the base of the handle. No matter how the handle is turned or lifted, wire cannot be twisted or bent.



A king pin assembly built to take impact loads. The load-carrying tapered roller bearing and large diameter steering ring ensures perfect alignment of the unit. Wires cannot bend whatever the angle of the turn.

Yale Pallet *Worksaver* handles merchandise for a leading warehouse.

Yale Worksavers are the only industrial electric trucks of their type that have the engineering features that control *all* the factors that cause breakdowns. Five of these features are shown at the left. They offer you longer truck life with less down time over the years for maintenance and repair. This is especially important if your operation requires only one or two trucks. Your costs—and this is true of operations of *every* size—shoot up when vital handling equipment is idle.

Of course, you get much more than unmatched reliability with Yale ***Worksavers.*** They are small, light, maneuverable—perform big-truck jobs but go where big trucks often can't, on freight elevators, over low-load floors and in tight areas. You can even reduce aisle widths, save space for more productive use.

Yes, a Yale ***Worksaver*** will do a great deal for your business. Why don't you find out now which model is best for your purposes? Choose from pallet, tractor, platform and high-lift fork types in capacities up to 7,500 lbs. Select with the assurance that only Yale ***Worksavers*** give you so many proven cost-saving features. For information, write Yale & Towne Manufacturing Company, Philadelphia 15, Pa., Dept. 472.

YALE* **INDUSTRIAL LIFT TRUCKS AND HOISTS**

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Gas, Electric, Diesel & LP-Gas Industrial Trucks • *Worksavers* • Warehousers • Hand Trucks • Hand & Electric Hoists

For more facts circle 533 on Reply Card

ENDS MAINTENANCE

in general pump service

Single-stage, double suction DMV-DHV general hydraulic pumps are available for heads to 350 ft., capacities from 275 to 2400 gpm.

Double shaft seals and sealed ball bearings—standard equipment on **DMV— DHV** *pumps do away with stuffing box attention and bearing lubrication*

Now, with the DMV-DHV pump, you no longer have any stuffing box worries. There's no repacking! No annoying pump shaft leaks! The Double Mechanical Shaft Seals used are completely self-adjusting. They don't require attention throughout their entire service life.

Moreover, greasing or oiling of pump bearings is done away with. Modern Cartridge-Type Ball Bearings are employed—with the lubricant permanently sealed in. Here's another advanced feature that makes the DMV-DHV design the simplest, most maintenance-free pump ever developed by Ingersoll-Rand for general hydraulic service.

Greater Compactness is obtained with this modern construction using mechanical shaft seals and sealed bearings.

See your nearest Ingersoll-Rand representative for further information.

Ingersoll-Rand

10-290 Cameron Pump Division
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PUMPS • CONDENSERS • TURBO-BLOWERS • COMPRESSORS • ROCK DRILLS
GAS & DIESEL ENGINES • AIR & ELECTRIC TOOLS

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

causes the bricks to crack. Higher cost of materials in the new brick is offset by the elimination of the 11-day heating and cooling period.

The higher temperatures withstood by the chemically bonded brick present the possibility that certain alloy steels which require a temperature of 3100 F or higher can be made in open hearth furnaces instead of small electric furnaces. *From Monsanto Magazine, published by Monsanto Chemical Company, St. Louis, Mo.*

Double Duty Steamer

BECAUSE OTHER types of cleaning equipment could handle only maintenance or production cleaning, a high pressure steam cleaner was chosen by the Lancaster Malleable Castings Co., Pa., to accomplish both types of work.

So that the steamer could be easily moved around the plant, it was mounted on wheels.

Cleaning intricate patterns is only half of the work done by steamer. It is used also on trucks and core box equipment

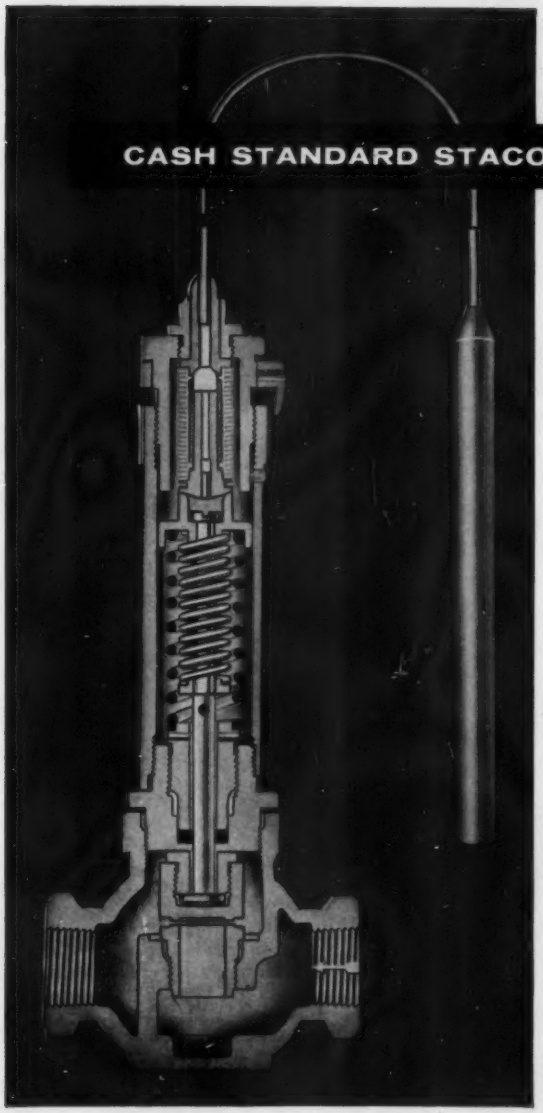
In maintenance operations, the steamer is used to remove the film of parting and sand adhering to the reentrant angles of intricate, aluminum patterns. A special box, made to hold the patterns, and fitted to one end of the unit, facilitates the cleaning operation. Formerly this film was removed by hand, using soap, water, rags and stylus. Use of high pressure steam has reduced maintenance time.

Other maintenance work for which the unit is used, includes the cleaning of industrial trucks and miscellaneous parts. In the production department, pattern and box core equipment are cleaned in a similar manner. *From a release for Malsbary Manufacturing Company, Oakland, Calif.*

Cash Standard Expands

by the addition of

Stacon Temperature Regulators

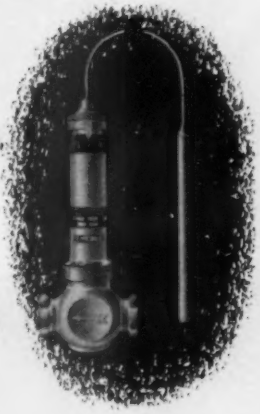


This line of temperature regulators (formerly manufactured by Farris Stacon Corp.) rounds out complete Cash Standard line of valves to solve any problem of temperature regulation or pressure control.

CASH STANDARD STACON TEMPERATURE REGULATORS

- Provide accurate temperature control for use with steam, liquids and gases.
- Self-operating and self-contained pilot-operating.
- Direct and reverse acting.
- Liquid filled thermal system for high operating power and uniform throttling action.
- Extremely compact construction with rugged field-replaceable thermostatic system.
- Overload protection to prevent overstressing of thermostatic system at over-range temperature.

Recommended for hot water heaters, tanks, kettles, plating tanks, bottle and can washers, degreasers, ovens, fuel oil heaters, brine circulating, process cooling, jacket cooling for compressors, diesel and gas engines, and many other uses.



What is *Your* Temperature Regulation Problem?

Cash Standard has the Answer!

Contact your Cash Standard control specialist or write Dept. D

CASH STANDARD

A. W. CASH COMPANY, P. O. Box 551, Decatur, Illinois

Pressure, Hydraulic, Temperature, Process and Combustion Controls

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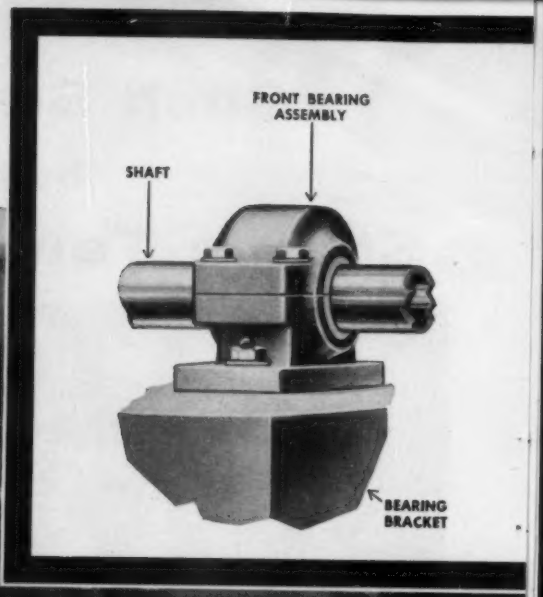
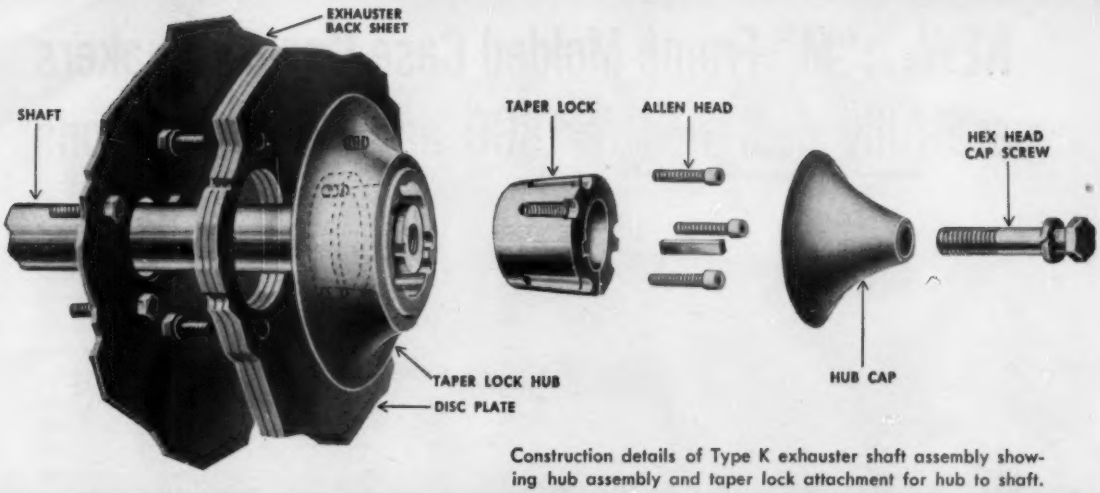
AAF EXCLUSIVE!





Construction details of Type K exhauster shaft assembly showing hub assembly and taper lock attachment for hub to shaft.

Special Hub Assembly on Industrial Exhauster ...cuts maintenance and replacement costs

Highly efficient unit an outstanding success in thousands of exhaust system installations

Talk about money-saving features – the new AAF Type K Industrial Exhauster has them! For one thing, the exclusive Taper Lock Hub Assembly permits fast, easy changeover on heavy-duty applications where periodic wheel replacement is anticipated. Cuts maintenance time in changing wheels. Eliminates the problem of impellers freezing to shafts. A NEW shaft is seldom required!

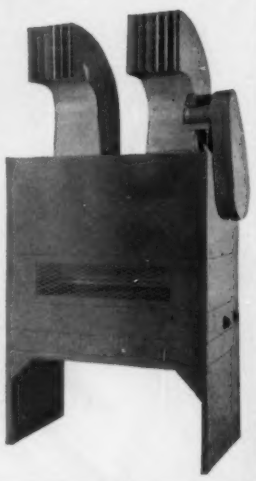
If you have an exhaust system problem of any kind, you can depend upon the AAF Type K Exhauster to provide high efficiency. Here is an exhauster that has already proved itself a heavy-duty workhorse in AAF Dust Control Systems faced with the severe requirements of high static pressures, heavy dust concentrations and frequently, highly corrosive conditions. In major industrial plants throughout the country, it has met with outstanding success!

OTHER DESIGN ADVANTAGES

NEW IMPELLER DESIGN	Another AAF Exclusive! Narrow wheel design assures smooth operation when handling heavy dust loads – even with material accumulation on the wheel!
HIGH EFFICIENCY	Maintained over a wide range of operations and variations in static pressures.
HEAVY DUTY SHAFT AND BEARINGS	Insure longer unit life. Narrow wheel design also increases effectiveness of shaft and bearings by reducing length of wheel overhang.
COMPLETELY ROTATABLE	In 45° increments of discharge positions in the field.
COMPLETELY REVERSIBLE	In the field, to allow either clockwise or counter-clockwise rotation.

Avoid air "Starvation" in your Plant with HERMAN NELSON Industrial Heaters for make-up air.

Replace exhausted air, balance minus pressures with Herman Nelson Industrial Heater make-up air units. They eliminate air "starvation" in various areas—such as sudden blasts when doors are opened . . . drafts and uneven temperatures that cause discomfort. Their big capacity does the job of many smaller, propeller-type units. Available in heat capacities ranging to one million BTU's.



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GENERAL OFFICES: LOUISVILLE, KY. • PLANTS IN LOUISVILLE, MOLINE (ILL.), MORRISON (ILL.), CHICAGO AND MONTREAL (CANADA)

BETTER AIR IS OUR BUSINESS

Propeller Fan | Centrifugal Fan | Unit Blower | AAF Dust Control Equipment

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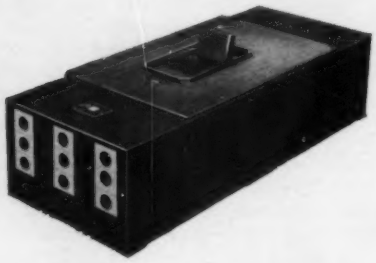
NEW..."M" Frame Molded Case Circuit Breakers are fully designed for 800 ampere applications

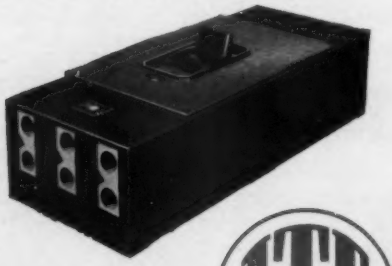
For applications which formerly required larger and more expensive equipment, you can now use the new I-T-E "M" frame molded case circuit breaker without sacrifice of quality. It offers optional pressure connectors for double or triple cable connections per phase contained within the circuit breaker case. Exclusive 3″ pole center design dimensions permit easy accessibility for front cable or rear bus and stud connections. And the "M" frame breaker is ideally suited for use in panelboards, power panels, switchboards, motor controls, bus duct plugs, and individual enclosures.

Available with interchangeable trip units providing continuous 600, 700 or 800 amp ratings in 2- or 3-pole construction for 250 volt d-c and 600 volt a-c service. Interrupting ratings (NEMA test procedure): 600 v a-c, 25,000 amp; 480 v a-c, 35,000 amp; 240 v a-c, 50,000 amp; 250 v d-c, 20,000 amp. For more information, write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.



Triple cable connectors accommodate three 300-400 mcm cables per phase.

Optional double cable connectors accommodate two 400-500 mcm or 600-700 mcm cables per phase.



I-T-E CIRCUIT BREAKER COMPANY • **Small Air Circuit Breaker Division**

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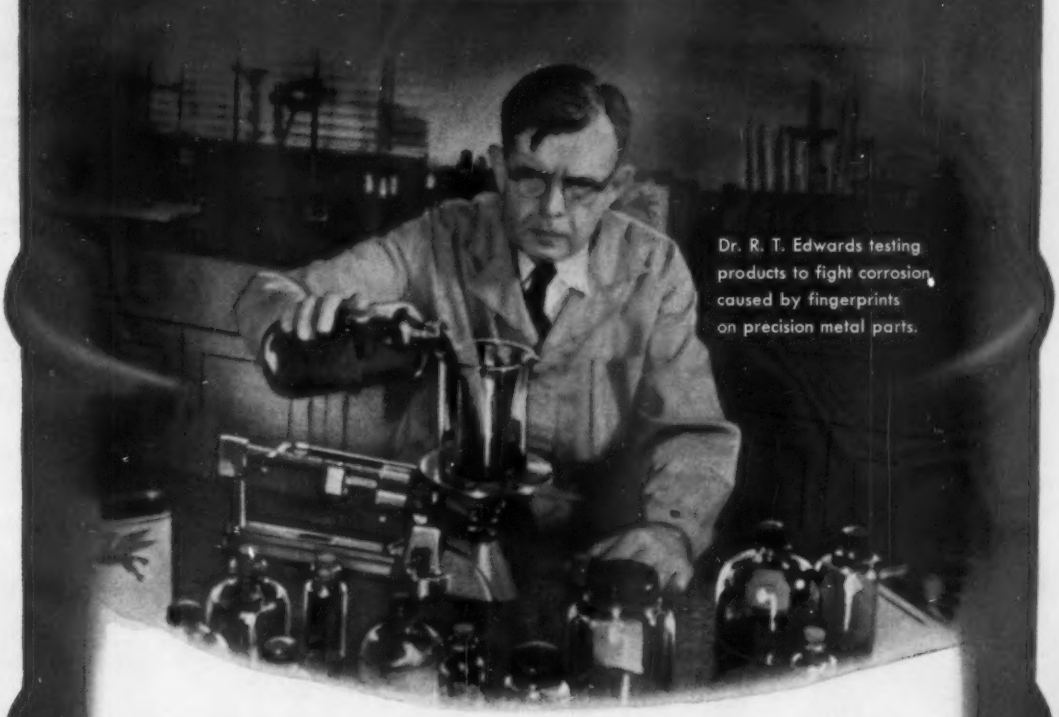
There's more in this barrel for you...



Dr. R. T. Edwards testing products to fight corrosion caused by fingerprints on precision metal parts.

MORE CONTINUOUS RESEARCH

to help you improve production and cut costs!

When you specify "Socony Mobil," you get petroleum products backed by *more continuous research* than those of any other oil company! This means products which are *continually improved* in quality and performance—*new* products when needed. Equally important . . . these complete research facilities are available to *you*—to help improve your production and lower your unit costs.

Socony Mobil products are also backed by *more* field engineers serving industry . . . *more* services for analyzing petroleum products in use . . . *more* on-the-job training of your personnel in correct product application . . . *more* approvals from machine builders . . . *more* practical experience—90 years!

Always specify Socony Mobil. There's *more* in every barrel for you!

SPECIFY **SOCONY MOBIL** FIRST STEP IN CUTTING COSTS

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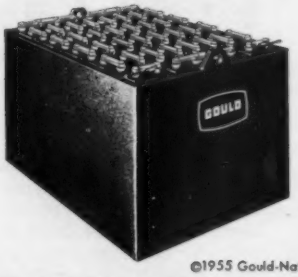
"Battery Performance is my Business!"

Your Gould Field Engineer has one job—to make sure you get greatest possible service from your batteries. In performing that job he sees to it that your batteries are properly cared for and maintained; he instructs your personnel in systematic maintenance methods; he helps you anticipate battery needs; he makes sure you get maximum battery performance.

Gould Field Engineering Service is nationwide. Every member is factory-trained . . . has plenty of on-the-job know-how. There's a Gould Field Engineer in your area. He's as near to you as your telephone. Call him. And when you see him, ask him for the new Gould Plus-Performance Plan material for your battery maintenance staff.



America's Finest! GOULD Industrial Truck Batteries

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GOULD Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

"BETTER BATTERIES THROUGH RESEARCH"

Always Use Gould-National Automobile and Truck Batteries

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When workers must operate to close tolerance, Owens-Illinois light-controlling Glass Block provide an extremely effective daylighting system. Daylight is directed upward and diffused over all parts of the room all day long.

The combination of light-controlling glass block and vision strip keep brightness at comfortable levels, provide vision and ventilation.

CBS Hytron Plant, Danvers, Massachusetts

OWENS-ILLINOIS GLASS BLOCK bring better light, reduced maintenance wherever used

In the plant, in the office and anywhere, panels of Owens-Illinois Glass Block make free daylight work overtime.

THE PRISMS within the block spread light evenly over all parts of the room from early morning to late afternoon. Daylight is at a comfortable level, while extensive glare and harsh contrasts are eliminated. No shades are necessary.

Glass block are virtually maintenance-free. They are extremely hard to break . . . can be hosed down to clean. They insulate so efficiently that it is easier to closely regulate room temperatures. And, because Owens-Illinois Glass Block are a modular building material, architects have the widest freedom in their design.

The complete Owens-Illinois Glass Block story is yours for the writing. Send for INDUSTRIAL DAYLIGHTING and see how glass block can mean better sight, better light, lower maintenance and great new design freedom in planning. Address Kimble Glass Company, subsidiary of Owens-Illinois, Dept. PE-2, Toledo 1, Ohio.

OWENS-ILLINOIS GLASS BLOCK
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OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Cut-Off Machine — How to Use It

PROPER USE or misuse of the cut-off machine often lies in the choice of wheels. For cutting hard materials, a soft grade of wheel is used; hard materials tend to dull the grits more rapidly, and the softer bond tears the grit away to expose sharp grit to the work.

The shape of the work also influences wheel choice. For example, solid stock should be cut with a softer wheel than is necessary to cut tubular stock. Tubing, presenting a small contact area to the wheel, imposes higher unit pressure which tends to break down the bond more rapidly.

In cutting ferrous metal, the wheel should be fed into the work as fast as possible. Feeding pressure should be steady after the wheel is in contact with the work, but not heavy enough to slow the wheel considerably. The faster the wheel is fed through the work, the greater the wheel life, according to Delta Power Tool studies.

Burrs on the work are often a problem in metal-cutting with abrasive wheels, particularly with soft work materials. The problem of burrs can be reduced when cutting soft stock by using a softer grade of wheel. However, this is often done with the sacrifice of some wheel life. When cutting high carbon steel which subsequently is to be machined, occasionally work hardening of the surface occurs. This can often be eliminated by using wet cutting methods.

Tests indicate that a high speed metal cutting steel saw blade is superior to abrasive wheel when cutting the nonferrous metals. The saw blade, running at 2000 rpm, cuts nonferrous metals faster than an abrasive wheel and practically eliminates the burr which often results when cutting soft materials. Though initial cost of a high-speed blade is greater than an abrasive wheel, service life of the blade is much longer.

Navy Develops "Stilt" for Workmen

DEVELOPED at the Naval Supply Center, Oakland, Calif., an aerial work platform rises 70 ft, to replace scaffolding in aircraft hangars at military installations. For Navy use, the platform will be used to provide working space for workmen who paint hangar ceilings, replace light bulbs or service sprinkler systems.

Inspector testing new platform stops at 50-ft. Outriggers provide stability

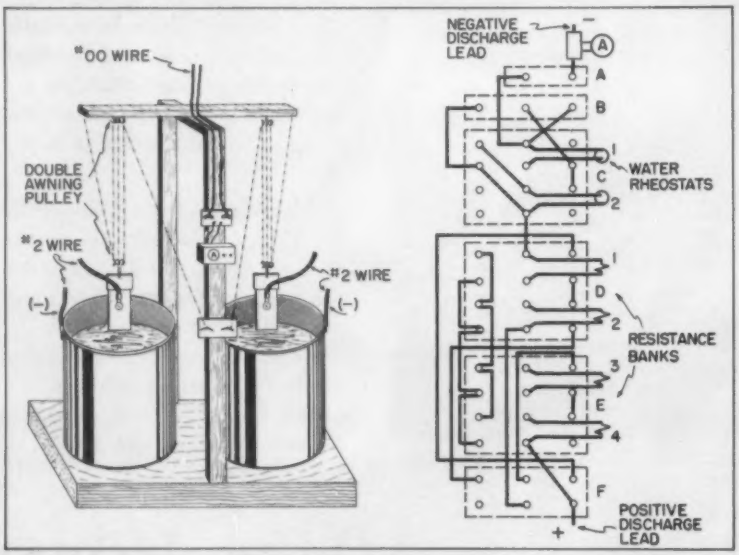
On the 4 ft by 8 ft platform, built to lift a crew of three or four men and a total load of 1500 lb, a removable 6-ft jack post is provided for lifting items such as roof trusses and beams.

Six telescoping tubes of seamless

(Continued on page 56)

Water Rheostat for Testing Battery Discharge Can Be Shop-Built

SIMPLE AND INEXPENSIVE, a water rheostat for test discharging batteries has been designed by Gould-National Batteries, Inc. Salt water-filled 55-gal steel drums are the principal resistance elements. The water barrel rheostat can be used instead of more expensive metal grids.



Sketch of water rheostat shows construction. Wiring diagram suggests circuit

A wooden scaffold supports metal bars which are immersed in the water. To vary the resistance, the bars are raised or lowered into the water, using a system of light duty pulleys.

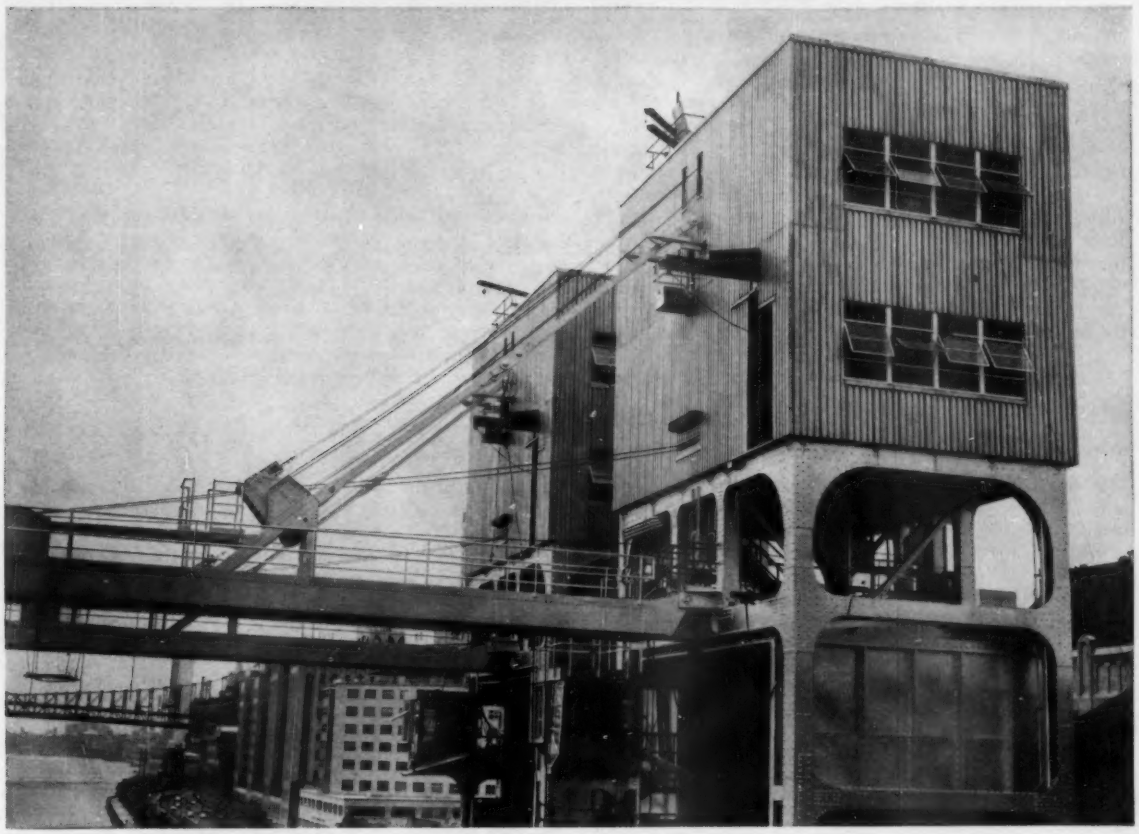
The barrel is always made negative and is connected to the negative terminal of the battery being tested. The metal electrode is the positive. A nonconductor should be provided to cover the bottom of the drums, to prevent the electrodes touching them.

A suggested circuit, containing an ammeter and the necessary switches, is shown in the drawing. Switch A is the main disconnect. Switch B will short circuit the water rheostats—closing it to the right shorts No. 1, to the left shorts No. 2. Switch C connects the rheostats in series when positioned to the right, and in parallel when in the left position.

Switches D and E regulate the load —right for 75 and 150 amp loads, left for 300 amp loads. Switch F carries a 75 amp load when in the left position, 150 amps in the right position, and is left open for a 300 amp load. The resistance banks are each 0.42 ohm, 75 amp capacity.

Parlon® Stays On!

An "All-Purpose" Municipal Paint



FOR GOOD RESISTANCE to coal gas, chemicals and chemical fumes, the New York City Transit Authority selected a Parlon-based paint for these new coal unloading towers. The tower was designed and built by Mead-Morrison Div. of the McKiernan-Terry Corp. The paint is RIW Korosist Chlorinated Rubber Base Paint, manufactured by Toch Brothers, Staten Island, New York.

Across the nation an ever-increasing number of municipalities are discovering the unique properties of paints based on Hercules Parlon (chlorinated rubber).

Wherever protective coatings must stand up to a demanding challenge—whether the requirement be traffic paint, or for a sewage plant; exterior finishes for masonry buildings, or interior protection for metal equipment—Parlon-based paints are providing longer service at lower long-term cost.

Parlon's unusual ability to withstand the corrosive effects of chemicals and salt water atmosphere plus its adaptability to masonry, wood and metal surfaces makes it the ideal all-purpose maintenance paint. Your local paint supplier can provide additional information, or write direct to Hercules.

Cellulose Products Department
HERCULES POWDER COMPANY
966 Market Street, Wilmington 99, Del.

CR56-1

PARLON CHLORINATED RUBBER PAINTS ARE AVAILABLE FROM 400 MANUFACTURERS UNDER THEIR OWN BRAND NAMES

For more facts circle 541 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

steel tubing and a hydraulic pump push the tower to its full height. The tubes overlap each other by five feet and are internally keyed to prevent rotation of the hydraulic column. Power is supplied by an electric motor plugged into any standard 220v power line. A manual control lets gravity lower the platform in the event of power failure.

The portable base—6 ft, 6 in. wide with a wheelbase of 120 in.—trails on 16-in. tires behind a small truck or tractor. Hinged outriggers at each corner of the base can be folded out into work position for stability, and at the end of each outrigger, a stabilizing screw jack anchors the tower in place.

When lowered for transporting, the platform is only 16½ ft above ground.

Automatic System Logs Data

AN ELECTRONIC SYSTEM that logs a plant's operating data and adds it up at the day's end, while keeping an eye on quality, has been designed by Minneapolis-Honeywell Regulator Company, for Esso Standard Oil Company's Bayway (N.J.) refinery. It is believed to be the first such system that incorporates computing and quality evaluation with conventional automatic data-handling operations.

At Bayway the new system will handle data gathering for production of a commercial solvent, automatically logging such operating data as temperature, pressure, flow, power consumption and product quality. It will store up running figures for flow and power used and add these up at the end of the day—the computation being done electronically. It also electronically computes the day's average temperature for a number of critical points. This is especially important in analyzing the flow and the over-all operation.

Translated into numbers, all data is fed automatically to electric typewriters. The flow and power measurements are also punched on tape for later use in cost accounting operations. When not actually recording, the system monitors a number of critical points, keeping track of conditions and picking up any deviations as they arise. These are immediately spotted on an "annunciator's panel" at the operator's desk.

Quality, in this case purity of the solvent, is measured by converting the desired quality into an electrical signal. This is constantly picked up on recording machines; if it slips below the de-

(Continued on page 58)

Interval Timer Interrupts Ammonia Flow to Prevent Turbulence

Contributed by Fred W. Hiller, Engineer, Mountain View Dairies, Long Beach, California

In our cold rooms, which are maintained at a temperature between -15 F and -20 F, we had considerable amount of trouble with frost-backs to the ammonia compressors. Every time a frost-back occurred, our pilot lights indicated that the solenoid valve on the particular coil affected was open, permitting a flow of ammonia into system, when there was already too much.

After noting that when we manually opened the circuit (at switch 6) thus closing the solenoid valve on the feed line, the condition soon disappeared, we set about determining a method of preventing the frost-backs.

Repeated attempts showed that if this solenoid valve was kept closed by breaking the electric circuit (this can be done by opening toggle switch 6) for a few seconds, when the switch was reclosed, the pilot light did not relight, indicating that the float switch in the system was remaining open. When the circuit is open, the solenoid valve is closed, so the solenoid was also remaining closed.

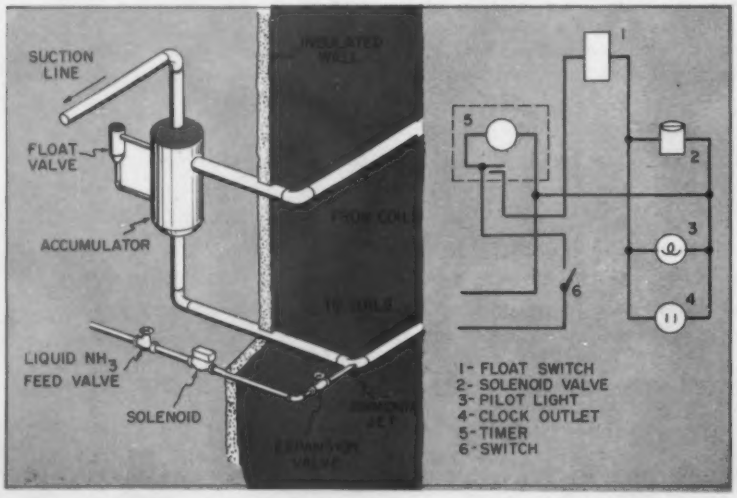
In another instance, we manually closed the ammonia feed valve (4) in the line. In a short time, the pilot light went out, indicating that the float switch had opened the electric circuit, thereby closing the solenoid valve. After a few seconds we opened the feed valve and found that the pilot light remained out, indicating that the float switch remained open.

It was apparent that due to the velocity of the liquid ammonia flowing out of the accumulator, as caused by the jet of liquid triggered by the solenoid, or by liquid ammonia spilling into the float chamber above the float, in the switch, the float was being kept at a false low level.

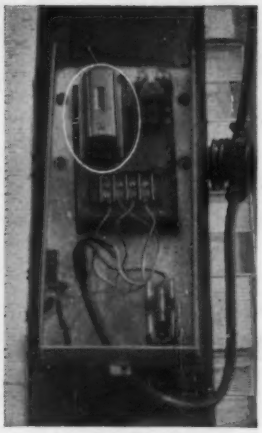
It also became apparent that as soon as ammonia movement in the system was stopped by stopping the inflow of warm ammonia through the jet, the liquid in the accumulator would settle down and the float would rise to its proper level.

Reasoning that the turbulence in the ammonia accumulator was causing our trouble by disturbing the float action, we looked for a method of "calming the waters" at frequent intervals, to smooth out the float action.

An interval timer, set to open the circuit to the float switch, has proved highly successful in this installation. It is set to open the switch for 37½ seconds each 15 minutes, thus shutting the solenoid valve for that length of time, regardless of the normal demands of the float switch on the solenoid. With minimum flow of liquid ammonia in the system during this short interval, the level in the accumulator steadies, and the float is better able to detect level variations, when the timer closes the circuit again.

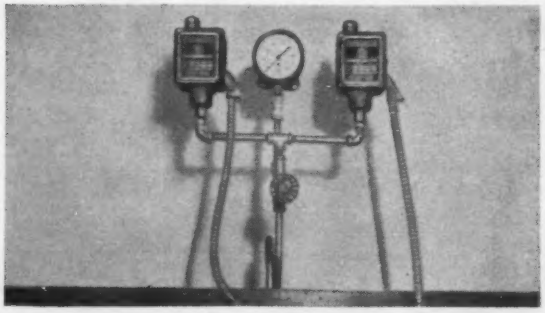


Sketch at left shows components of refrigeration system. Ammonia jet is used to add momentum to liquid in line to coils. Clock outlet is for periodic time checks



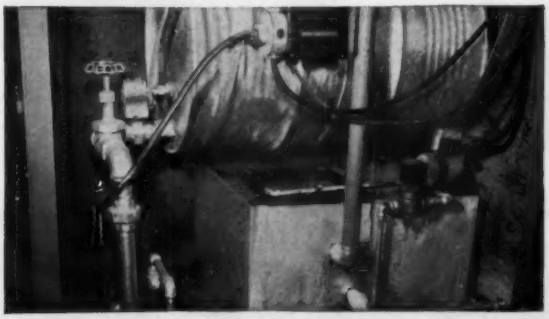
Power factor correction capacitors at Kansas City Power & Light are switched in when temperature changes . . . to compensate for air conditioning loads. Honeywell Industrial Thermostat on the utility pole does the job . . . at much lower cost than usual current control devices.

Honeywell Controller Cost $19.00*



Hosiery mill steam plant saves $1175 in fuel yearly by installing a pair of Honeywell Pressure Controllers, which make it easy and foolproof to switch from high pressures for peak production to low pressures for supplying night shift and weekend needs.

Honeywell Controller Cost $40.00*



Water consumption is reduced at Atwood Vacuum Machine Co., Rockford, Ill. A Honeywell *Aquastat* temperature controller and solenoid valve turns on a spray of tap water to reduce temperature of the coolant only when needed . . . with resultant decrease in water consumption.

Honeywell Controller Cost $12.50*

**Approx. cost. Prices subject to change without notice.*

Honeywell Industrial Controls

Reduce costs

Don't overlook these simple, low-cost controllers...they're the ideal solution to hundreds of problems

Cutting costs for materials, fuel or utilities doesn't always call for elaborate automatic control equipment. In scores of spots around your plant, you can effect substantial savings by putting simple, inexpensive Honeywell Industrial Controls on the job.

By regulating temperature, pressure, vacuum, liquid level or humidity, these versatile controls can help you avoid waste . . . reduce rejects . . . save manpower . . . prevent down-time. More than 7000 different models give you an unequalled variety from which to choose. They're simple, rugged and dependable . . . and cost surprisingly little. Readily applied to any kind of equipment, they can improve safety, protect quality of production, increase output and minimize maintenance in hundreds of different ways.

This comprehensive line of precision-made products is backed by the extensive application experience and world-wide service facilities of the largest manufacturer of controls. For a discussion of how they can be applied in your own plant, call your local Honeywell sales engineer . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

Also manufacturers of a complete line of precision measuring, recording and controlling instruments.

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

For more facts circle 542 on Reply Card

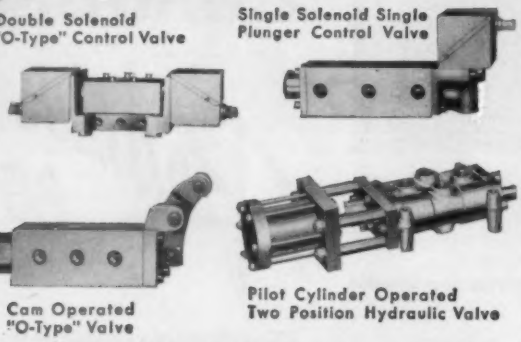
SELECT

Quick-As-Wink®

AIR AND HYDRAULIC

CONTROL VALVES

DESIGNED AND BUILT TO ASSURE


Double Solenoid "O-Type" Control Valve
Single Solenoid Single Plunger Control Valve
Cam Operated "O-Type" Valve
Pilot Cylinder Operated Two Position Hydraulic Valve

efficient and dependable operation of your machines and machinery

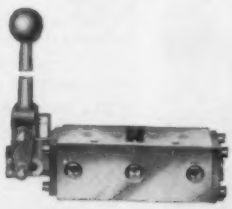
Can you afford to gamble with less?

• Why build — or buy — expensive machines and then restrict their output and risk breakdowns and production tie-ups because of inferior control valves?

Positive and fast acting Quick-As-Wink valves meet the most exacting requirements. They deliver dependable precision performance month after month and year after year. Machine operators, foremen, superintendents *and machine builder trouble shooters* will tell you that there is nothing better than a Quick-As-Wink valve. REMEMBER,— your efforts to increase production and cut costs can only be as successful as the air and hydraulic valves that control the operations. Don't gamble. Play safe. Specify Quick-As-Wink valves. Get full details. Write for Bulletin No. 531, *Today!*

Ask us also about...

FOOT OPERATED SLIDING SLEEVE VALVE ⅜" to 1" sizes. Single pedal spring return and two pedal designs. Operator has both hands free to handle the work.



LEVER OPERATED SINGLE PLUNGER VALVE ⅜" to 1½" sizes. Widely used for controlling single and double acting cylinders and as pilots for other valves.

Quick-As-Wink®

AIR AND HYDRAULIC

Control Valves

Hand, Foot, Cam, Pilot, Diaphragm and Solenoid Operated

Mfd. by C. B. HUNT & SON, INC., 2089 East Pershing St., Salem, Ohio

For more facts circle 543 on Reply Card

OPERATION— PRODUCTION

(O and P begins on page 54)

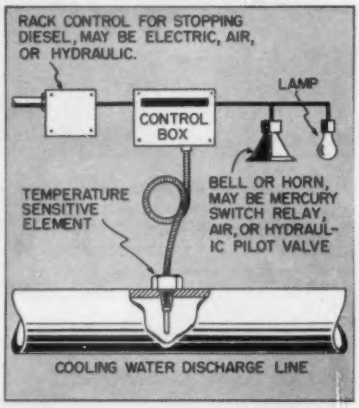
sired characteristics, an alarm sounds.

Supplementing, not supplanting, the regular operators by centralizing all current operating data at one point, it minimizes the strain on the operators who otherwise would have to manually collect data from many different locations.

Installed in the central control room at the Bayway unit, the system is laid out with conventional graphic panel control boards. It comprises two 6 ft by 7 ft by 2 ft steel cabinets. One houses some 70 transducers that convert pneumatic signals into electrical signals and the other contains the necessary electrical equipment to convert these signals into numbers and to perform the electronic computing functions. The signals are fed to an operator's console desk, flanked by two electric typewriters which automatically type out records, generally once an hour.

No Water? Stop the Engine

Contributed by R. B. Taggs


RACK CONTROL FOR STOPPING DIESEL, MAY BE ELECTRIC, AIR, OR HYDRAULIC.
LAMP
CONTROL BOX
TEMPERATURE SENSITIVE ELEMENT
BELL OR HORN, MAY BE MERCURY SWITCH RELAY, AIR, OR HYDRAULIC PILOT VALVE
COOLING WATER DISCHARGE LINE

Arrangement of sensing element and controls for shutting off diesel engine in the event that flow of cooling water stops. Bell and lamp are audible and visual indicators of attendant heat rise

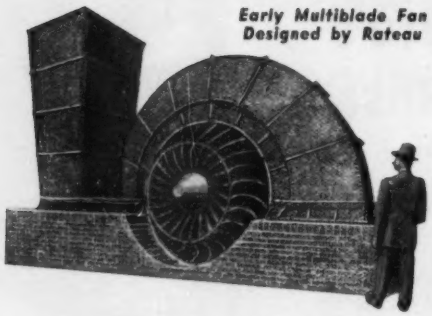
Roll-Up Spray Booth Ceiling

IN THE PROCESS of shoe manufacturing, a latex bonding agent is sprayed on the bottom of the shoes prior to putting on the sole. As it is sprayed, hundreds of sponge-like threads are formed on the ceiling of the spray booth, as the exhaust fan carries them in its air stream.

At the Bee & Bee Shoe Co., Manchester, N.H., a wire screen was suspended under the booth ceiling, to

For more facts circle 544 on Reply Card →

Bayley FAN-A-GRAFICS
For Equipment Engineers

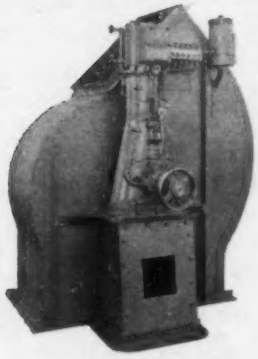


Early Multiblade Fan Designed by Rateau

EVOLUTION OF CENTRIFUGAL FAN DESIGN

THE French engineer, Camille Rateau (1863-1930) designed his forerunner of multiblade centrifugal fans on the basis of theories borrowed from experience with turbines and other centrifugal devices. Intricate castings and forgings, weak and brittle materials, slow and cumbersome prime movers, massive masonry and wood structures, were the rule.

Today's centrifugal fan evolved from theory based on specialization in fan design and usage. Modern fabricating and welding techniques, materials and components, high-speed prime movers, streamlined concrete and steel structures are now available. These refined tools can provide centrifugal fan designs adapted to modern needs, when combined with skill that is born of experience.



Early Model, BAYLEY Forward Curve Steam Driven Fan

NO. 1 OF A SERIES of "Fan-A-Grafics." Ask for FREE Pocket Cutter to trim out coming sheets for your files.

A Century of Manufacturing . . .

BAYLEY, founded one hundred years ago, a pioneer in iron fabrication, machine building, and foundry work, became familiar with basic principles and practical application of heating and ventilating equipment as early as 1885.

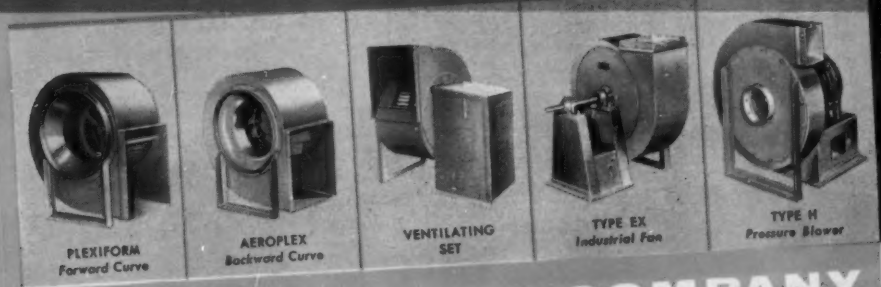
This broad knowledge and background has been essential to the development and application of all types of centrifugal fans—for industrial exhaust, materials handling, high velocity air conditioning. Bayley engineers have used basic research to convert this experience into modern designs involving various wheel styles, proportions, sizes, and arrangements.

What Your Modern-Day Fan Provides . . .

The 1956 Bayley Fan embodies the most effective use of materials and methods, achieving maximum strength-weight ratio. Structural problems are simplified. Clean design minimizes breakdown hazards. Designs are flexible—readily adapted to specific applications. Result—SYSTEM-MATCHED designs providing maximum efficiency and economy throughout the completed installation.

Modern Bayley 445 Aeroplex Fan

Showing Flexible Coupling and Motor



Engineered
AIR HANDLING EQUIPMENT

BAYLEY BLOWER COMPANY

1825 SOUTH 66TH STREET
MILWAUKEE, WISCONSIN

How Did Wyman-Gordon Cut Out ALL Lost Production Time In Moving a Machine Shop?

←Here's the answer

The old-timers said it couldn't be done in less than five days — but Barry Leveling Mounts so speeded the reinstallation of lathes, millers, and grinders that the entire moving operation took only a two-day weekend. The vital test-preparation department was ready for work again on Monday morning. The machines set on Leveling Barry Mounts required no drilling of floors, no lagging, no shimming — they were just spotted according to plant layout, and quickly leveled. And because Barry Mounts isolate vibration, the machines do not walk, building-borne noise is reduced, and the accuracy of the precision machines in the Test-preparation Department is protected.

Ask Barry how YOU can cut machine-moving costs.

How Did Bullard Stop ALL Toolroom Rejects Due to Vibration?

With the Bullard Company's toolroom only 50 feet from a main-line railroad track, the vibration from passing trains often caused work spoilage or lost time as grinder operators waited for trains to pass. Moving the toolroom was out of the question. But the seven surface grinders were isolated from external vibration by a simple installation of Leveling Barry Mounts under each machine — at a cost of only $50 per machine. Rejects due to vibration were completely eliminated!

Ask Barry how YOU can protect precision machinery.

How Can YOU Gain These Advantages?

It's easy. Write for our plant survey booklet M-256 that tells you where to look for savings in your plant, then talk over your machine-mobility needs and vibration problems with a Barry representative or Barry Mount distributor.

BARRY CONTROLS
INCORPORATED
SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

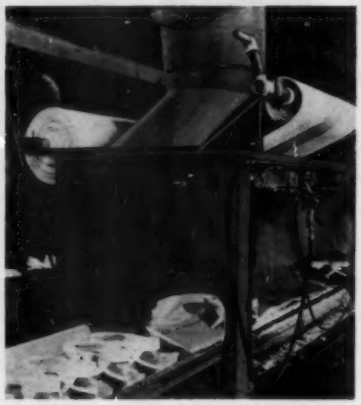
BARRY B MOUNT
SOLD THROUGH INDUSTRIAL DISTRIBUTORS

910 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

←For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 51)



Take-up roll at right pulls mesh through the booth from supply roll at left

catch these threads before they reached the fan itself and fouled the blades.

The wire screen was impractical, however, because frequent cleaning of the screen was necessary to continue spraying operations. Unless cleaned, the screen would clog, and interfere with air flow through the booth.

Bee & Bee engineers, together with the Chase Bag Co. of Chicago, developed a means of replacing the wire screen with a sturdy paper woven mesh, called Saxolin. A two-roll mechanism was devised so that a clean square of the mesh can be moved into position to serve as the booth ceiling, as the preceding mesh area became clogged.

Conversion of all four of their spraying booths to use of Saxolin yardage has been completed at the shoe company.

LP-G Conversion Pays Off

DELTA AIRLINES is converting the engines of their Atlanta Airport fleet of 26 tugs and energizers to liquefied petroleum gas in a program that will save nearly $320 a year on each unit's operating costs.

Conversion of the non-highway, non-load bearing equipment at the airport followed an operating experiment by Delta's maintenance department and the General Gas Corp. of Baton Rouge, La., a distributor of LP-Gas in the south and southeast.

A five-month test proved that LP-Gas usage resulted in reduced fuel consumption, longer life for both engines and crankcase oil and less maintenance work. Delta spokesmen point out that the average cost for LP-Gas in their ground equipment reflects a

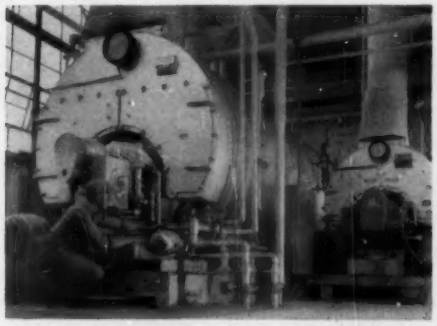
How a company planned ahead for economy in boiler operation and "reserve" for future expansion . . .

Bendix-Skinner Division, Bendix Aviation Corp., Royal Oak, Mich.
Architects & Engineers—Giffels and Vallet, Inc. . . L. Rossetti—Detroit, Mich.
Heating Contractor—The Donald Miller Co., Detroit, Mich.

KEWANEE reserve + plus rating

. . . formed the basis for boiler selection at Bendix-Skinner Division, Bendix Aviation Corporation

With an eye on the present and to the future, Bendix-Skinner executives selected Kewanee Boilers for their Royal Oak, Michigan plant. The problem of the present was to select boilers capable of supplying sufficient power for both heating and processing at lowest operating and maintenance cost. Past experience convinced Bendix-Skinner executives Kewanee could be depended upon for savings and satisfactory performance under all conditions. The problem of the future was providing boilers with sufficient built-in reserve to accommodate increased loads when plant expansion came. Here Kewanee was first choice again because Kewanee Reserve Plus Rating certifies 50% extra power is built in for pick-up and additional capacity requirements. It means "cruising speed" operation, with the boiler *loafing* along at a *leisurely* rate, using less fuel . . . delivering greater efficiency. That's because Kewanee Reserve Plus assures a boiler that's rated on nominal capacity with sufficient reserve to take care of emergencies—fluctuating loads—expansion. Bendix-Skinner executives knew the fallacy of boilers rated on maximum capacity which must run at full speed constantly, so, naturally their choice was Kewanee.



Here are 2 Kewanee Reserve Plus Rated Boilers installed at Bendix-Skinner. At left, 88-100 Kewanee Boiler-Burner Unit—100 GPH. At right, 78-25 Boiler-Burner Unit—25 GPH.

KEWANEE BOILER DIVISION
of American-Standard
101 FRANKLIN STREET, KEWANEE, ILLINOIS

KEWANEE BOILERS

You can depend on Kewanee Engineering

For more facts circle 546 on Reply Card

In concrete or steel...you can set fastening studs *in seconds* with the REMINGTON STUD DRIVER

THERE'S NO TIME LOST on a construction fastening job with the Remington Stud Driver. You can set up to 6 studs per minute with this powder actuated tool—every stud arrow-straight!

And here's more news: you can set *both ¼" and ⅜" diameter studs.* You have a choice of 40 styles and lengths of Remington Studs in both diameters—a choice of 22 or 32 caliber power loads. All it takes is 90 seconds to change barrels and you're ready for practically *every* fastening job—light, medium or heavy duty!

Once you see the Remington Stud Driver in action you'll be convinced that here is the easy, economical way to fasten door bucks, furring strip—any of dozens of fixtures—to steel or concrete. Why not ask your distributor for a demonstration? For more information, just mail the coupon below.

Remington DUPONT

Industrial Sales Division, Dept. P.E. 2
Remington Arms Co., Inc., Bridgeport 2, Conn.
Please send me your free booklet which shows where and how to use the cost-saving Remington Stud Driver fastening method.

*Name*_____ *Position*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

For more facts circle 547 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

savings of more than nine cents per gallon.

Metered equipment used in the test period showed that fuel consumption was lower when LP-Gas was used. Additionally, the bottled gas caused no fouling of spark plugs, and the

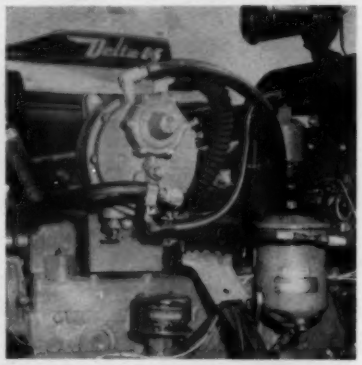


Fig. 1. Vaporizer-regulator on top of engine block is major new component

Fig. 2. Fuel tank mounts behind driver's seat, with control valves handy

ground equipment benefitted from the gas' higher rating of 100 octane.

Cost of the conversion of each unit of the fleet averaged $150.00. Annual savings have been estimated to be $319.98 per unit, including $268.08 in reduced fuel costs, $5.28 in lubricating oil and $28.62 per year as a result of longer engine life.

Tilter Dumps Rivet Hoppers

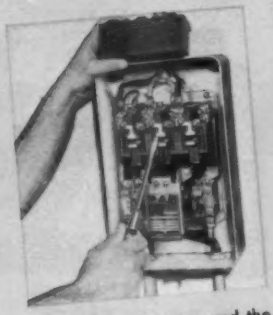
COMBINING CRANES, conveyors, and industrial trucks makes for efficient materials handling at the Gary Screw and Bolt Division in Gary, Indiana. The fastener firm, which turns out an average of seven million pounds of finished products per month, has found that fork and platform trucks add to the efficiency of a materials handling

For more facts circle 548 on Reply Card ——→

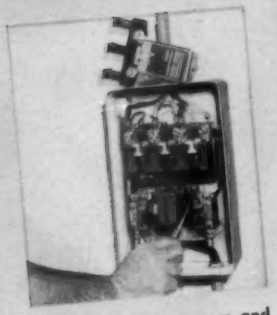
Here's Why We Specify
SQUARE D Starters
on the Machinery We Buy

PERFORMANCE, EASY INSPECTION AND MAINTENANCE

Sure, we like Square D performance because it keeps our "down time" at a minimum. BUT—everybody knows that even the best starter needs periodic inspection and preventive maintenance. We like the way Square D makes it easy to handle those routine jobs.



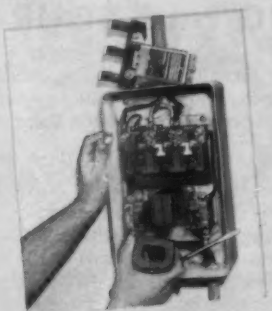
1 Loosen two screws and the arc chamber cover comes off. Every contact surface can be inspected at a glance.



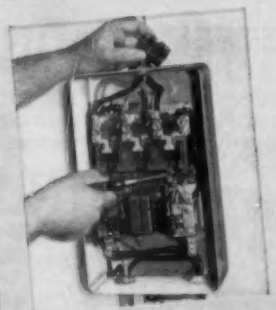
2 Remove four screws and entire movable assembly can be lifted off. Disconnect two wires and slip off magnet coil.

OFF-THE-SHELF PARTS KITS

They make normal maintenance and modifications easier than ever. Packaged parts include interlocks, contacts, coils, overload relays, pushbuttons and selector switches. They're easy to buy, easy to identify, and faster to install.



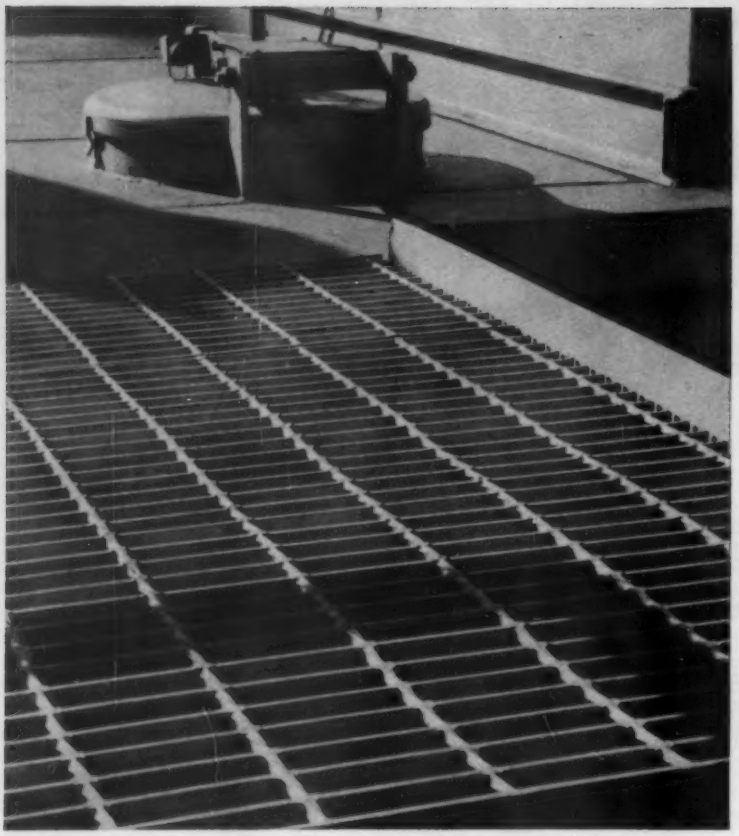
3 Contacts are attached with separate screws—they can be removed and replaced without disturbing any wiring. A screwdriver is the only tool needed.



4 Sizes 0 through 4 starters have these separate mounting electrical interlocks for easier installation. Contact block is attached from front of panel with two screws.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY



... make every step a safe step

BLAW-KNOX ELECTROFORGED® STEEL GRATING and STAIR TREADS

Indoors or outdoors, you can provide safe walking conditions throughout your plant on floors, stair treads, platforms, walkways and catwalks. For Blaw-Knox Electroforged Steel Grating brings you these exclusive features:

1. rigid one-piece construction—easy to install
2. non-slip twisted crossbar—for safe footing
3. three types of bearing bars
   - square bars—for smoothest walking surface
   - knurled bars (Furro-Grip)—for extra safety plus relatively smooth walking surface
   - serrated bars—for maximum safety under extremely hazardous skid conditions
4. no sharp corners to clog—self-cleaning
5. all surfaces accessible—easy to paint
6. maximum open area—for light and ventilation

Write for your copy of new Bulletin No. 2486 —or send dimensional sketch for quotation.

BLAW-KNOX

BLAW-KNOX COMPANY

BLAW-KNOX EQUIPMENT DIVISION

Pittsburgh 38, Pennsylvania

GRATING APPLICATIONS: floors • platforms • walkways • catwalks • stair treads • fan guards • shelving • and many other uses, both outdoors and indoors, for versatile steel grating

For more facts circle 549 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

Fig. 1. Operator moves in to pick up hopper of rivets with special attachment

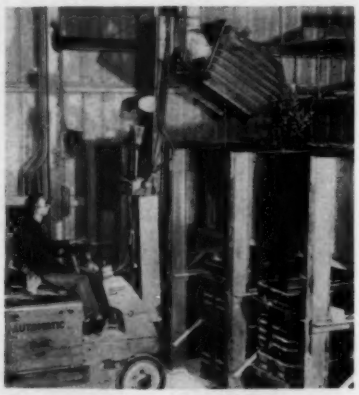
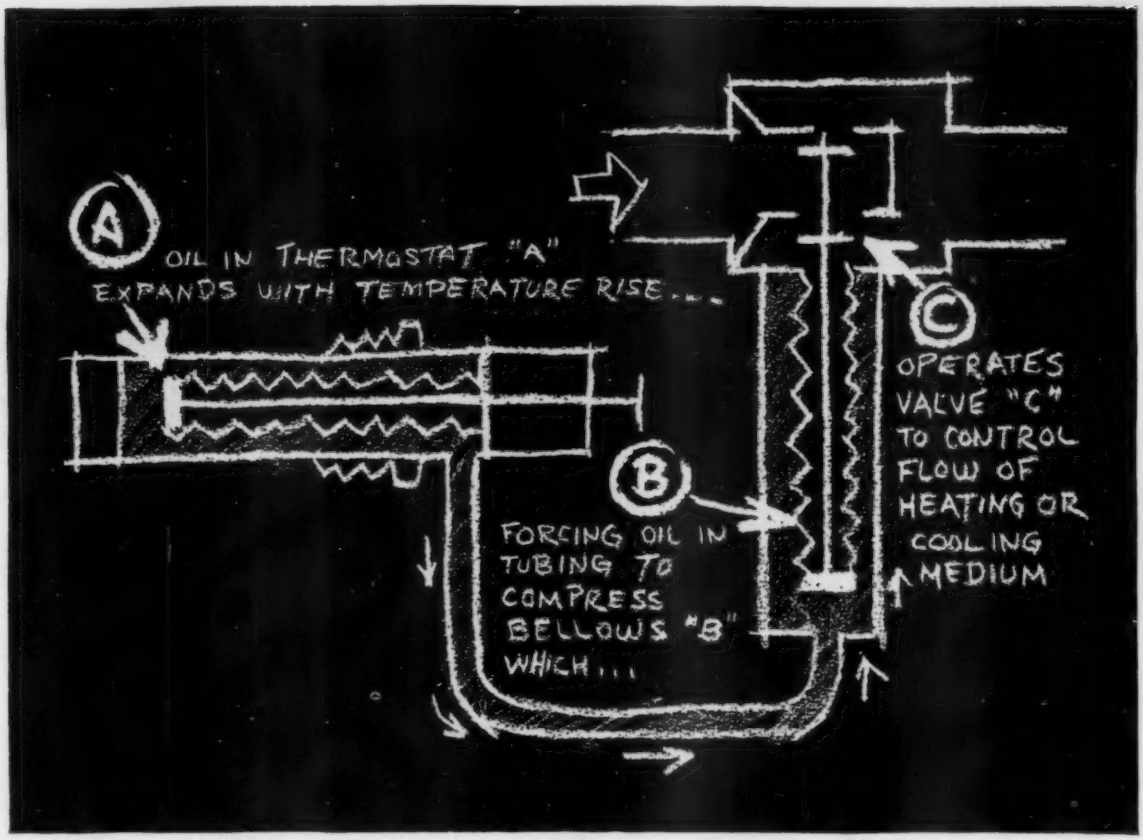


Fig. 2. Hopper of rivets is dumped into the loading bin by tilting device

system that depends on overhead crane and conveyor systems for heavy-duty handling assignments.

Since a variety of shipping packing methods and containers are used, shipping and handling of finished products represents a continuous problem. Helping to solve this problem is a fleet of 11 electric industrial trucks manufactured by the Automatic Transportation Co.

In the cold rivet department, an industrial truck equipped with a special hopper-handling attachment performs a key operation. As cold rivets are formed by continuous-process upsetting machines, they are automatically conveyed through chutes into special steel hoppers for handling in bulk lots. The truck used in this operation is a fork-lift type unit equipped with a special attachment that engages the hoppers, picks them up, and dumps them into the bins, where they are fed by gravity into containers for packaging and shipping.


A
OIL IN THERMOSTAT "A" EXPANDS WITH TEMPERATURE RISE...
B
FORCING OIL IN TUBING TO COMPRESS BELLOWS "B" WHICH...
C
OPERATES VALVE "C" TO CONTROL FLOW OF HEATING OR COOLING MEDIUM

Automatic Temperature Control

AS SIMPLE AS A-B-C !

And what could be simpler!

Just take another look at that rough sketch. That's all there is to it. A simple thermostat — a length of tubing — a valve. That's all!

That's the trouble-free design of the Sarco SELF-POWERED temperature control. And each year, thousands give accurate service in all industries ...for firms such as Colgate-Palmolive Company, Sinclair Refining Company, Swift & Company.

These temperature controls are simple, inexpensive, dependable, effective. No highfalutin gadgets that take a technician to read and a specialist to fix! Self-contained—no exposed mechanism. Packless. No outside power connections. Can be installed by any pipe-fitter.

And you'll find these temperature controls wonderful for about 85% of your jobs...all but those few specials that call for elaborate, costly control.

Cost? Mighty low! For example, the ½" size is yours for about $100. It's good economy to specify AUTOMATIC temperature control for ALL control jobs, not just the big ones.

SARCO COMPANY, INC.

Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

Please send information on your simple, inexpensive temperature controllers:

☐ Self-powered type for use on_____

☐ Electric indicating type for use on_____

Name_____

Firm_____

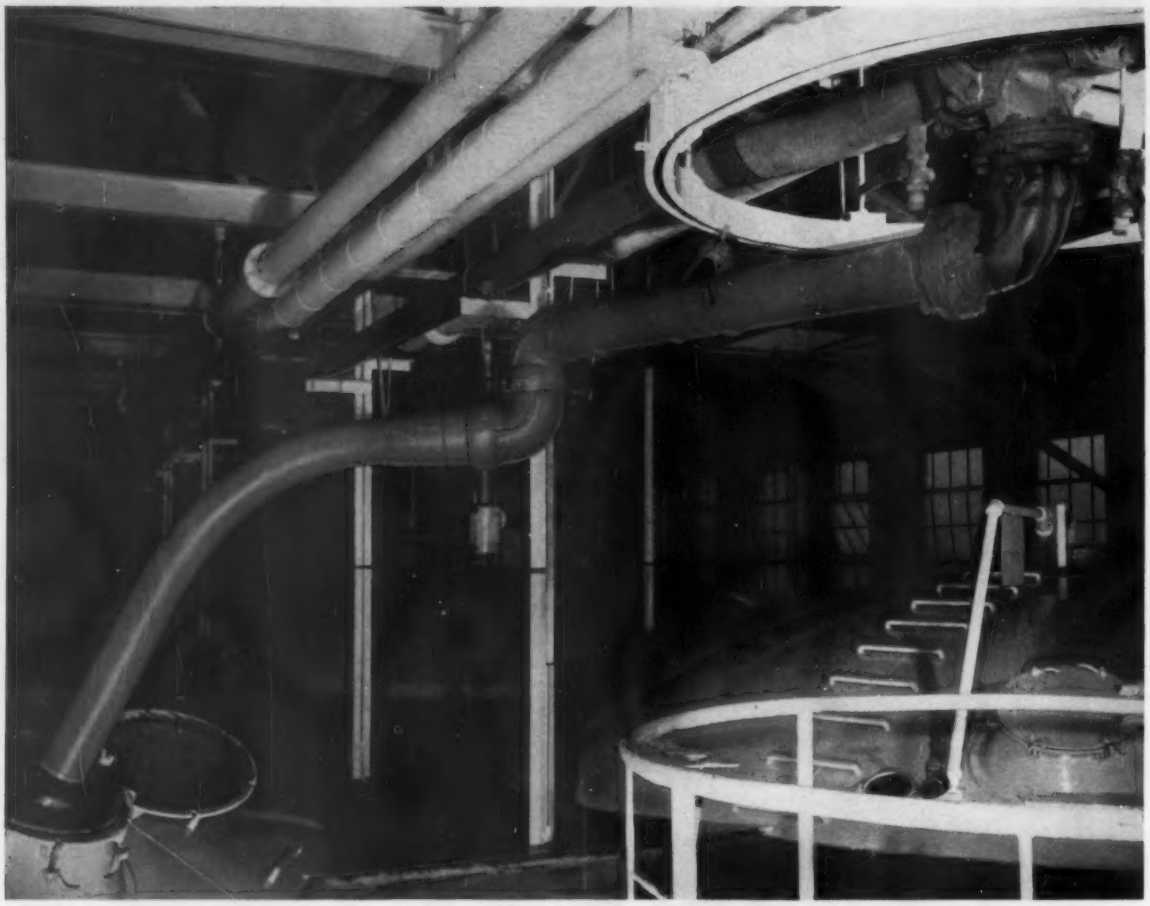
Address_____

City_____ State_____

21368

For more facts circle 550 on Reply Card

HIRAM WALKER REPORTS ON CHIKSAN SWIVEL JOINTS



NO MAINTENANCE IN 11 YEARS!

That's the performance record of the Chiksan swivel joints at the Peoria, Illinois plant of the Hiram Walker Company. Day in and day out for eleven years, Chiksan swivel joints have given the necessary flexibility of flow lines, and safety of operation in the transfer of mash to the fermenters without line rupture or loss of product. The packing on these swivel joints *has never been changed* even though low pressure steam is continually run through the assemblies when they are not in operation. Assure yourself of minimum maintenance with long trouble free operation by specifying versatile Chiksan swivel joints.

Chiksan swivel joints turn with full 360° rotation in 1, 2 and 3 planes, handling, air, hydraulics, fuels, oils, water and other fluids.

WRITE FOR CHIKSAN CATALOG 212

CHIKSAN

Subsidiary of Food Machinery and Chemical Corporation

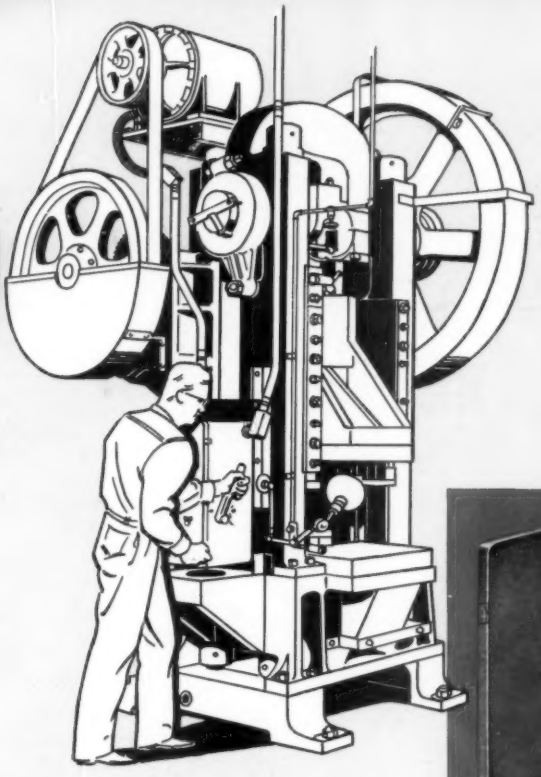
fmc

CHIKSAN COMPANY, Brea, California • Chicago 3, Illinois • Newark 2, New Jersey • Well Equipment Mfg. Corp., (Division) Houston 1, Texas • Chiksan Export Co., Brea, California; Newark 2, New Jersey • Chiksan of Canada, Ltd., Edmonton, Alta.

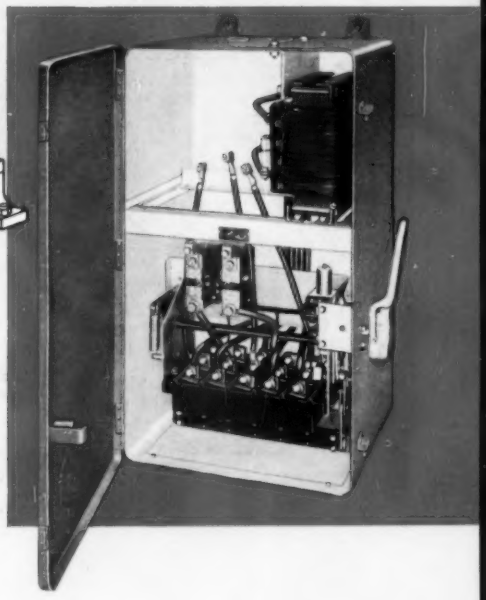
For more facts circle 551 on Reply Card

For more facts circle 552 on Reply Card→

The Sign of
QUALITY
Motor Control



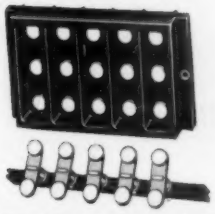
Bliss No. 207 Press in the plant of V. W. Danielson Manufacturing Co. It is started with an Allen-Bradley Bulletin 646 manual autotransformer starter, as shown below, with cabinet open to show air-break contacts and reduced voltage transformer.



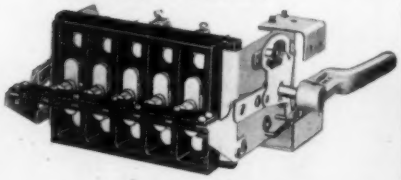
BULLETIN 646

MANUAL AUTOTRANSFORMER STARTERS with AIR-BREAK CONTACTS up to 75 HP, 220 V; 150 HP, 440-550 V.

Stationary and Moving Contacts of Bulletin 646 Reduced Voltage Autotransformer Starter



Cadmium silver stationary contacts are mounted in the arc hood and the moving contacts are on the crossbar.



Simple switching mechanism which first connects motor to reduced voltage taps and then shifts it to full line voltage.

Freedom from messy, oil-immersed starter contacts and oil tanks . . . that's the outstanding advantage of Allen-Bradley Bulletin 646 autotransformer starters up to 75 hp, 220 v; 150 hp, 440-550 v. This range covers most squirrel cage motors. The air-break, cadmium silver contacts need no maintenance.

The starting lever is so interlocked that the operator must pull the lever FIRST to the START position. After a preset, adjustable interval, a bell rings to indicate when the lever should be pushed into the RUN position. The starter is held in the RUN position by a magnetic latch, which drops out and stops the motor in case of overload or line failure.

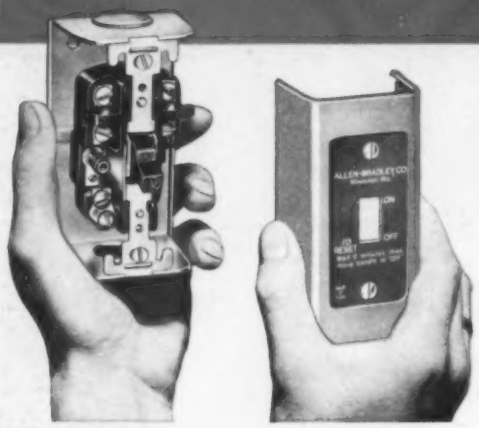
In flour mills, grain elevators, and other places with explosive dust hazards, oil-immersed contacts must of necessity be used. For such applications an oil tank and copper-to-copper contacts can be supplied. Write for Bulletin 646.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

2-56-M

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

SMALL MOTORS
need overload protection too!



Because

SMALL MOTORS CAN BE AS IMPORTANT TO PRODUCTION SCHEDULES AS LARGE MOTORS

Here is an outstandingly popular starter for applications using motors of ONE HORSEPOWER OR LESS.

It is a small, manually operated starter that is equipped with a time-tested, reliable A-B overload breaker. A soldered ratchet trips the operating lever in case of a sustained overload. It is reset, after tripping, merely by moving the operating lever to the OFF position. Overload heater elements are available to cover the ratings of this starter.

The Bulletin 600 starting switch is available in single and double pole construction. Its double break, silver alloy contacts provide high interrupting capacity. The contacts are always in good operating condition. They never need to be cleaned, filed or dressed. Please write for a copy of Bulletin 600 for complete information on the Bulletin 600 line.

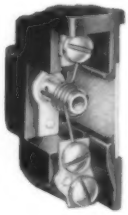
SIMPLE DESIGN

Simple ON & OFF snap switch . . . easy access to terminals . . . ample wiring space . . . silver alloy contacts need no cleaning or maintenance.

ATTRACTIVE APPEARANCE

Streamlined enclosure in grey enamel, and bonderized to assure positive binding of enamel finish to resist corrosion. The pilot light is optional.

OVERLOAD BREAKER



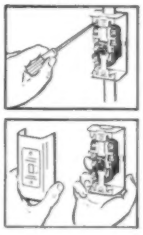
According to National Elec. Code ruling, motors of 1 hp or less, automatically started by thermostat, float switch, etc. must have overload protection.

FITS STANDARD SWITCH BOXES

Bulletin 600 starters fit any standard 2½ in. deep wall switch box.

Can be mounted in machine frame or base. Available with pilot light.

EASY TO INSTALL

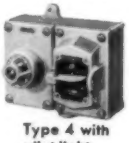


Remove 2 screws on front of starter . . . slip off cover . . . attach conduit . . . pull in wires and connect to terminals . . . replace the cover.

VARIETY OF ENCLOSURES

Type 7 for hazardous locations.

Type 4 watertight.



Type 4 with pilot light.

Allen-Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

A-B Quality

ALLEN-BRADLEY

BULLETIN 600 STARTING SWITCHES

QUALITY

2-56-MR

JENKINS Fig. 106-A

The FIRST
Renewable Composition Disc
BRONZE GLOBE VALVE
150 lbs. Steam 300 lbs. O.W.G.
⅛ in. to 3 in.

Making a Work Horse a Champion

Take a Fig. 106-A apart. It's easy to see the reason why it's the "champion" of disc-equipped Bronze Globes. Every part, from heatproof handwheel to pipe ends, reflects the design and construction skill of generations of Jenkins Valve specialists.

Jenkins Bros. introduced the first renewable composition disc Globe . . . is still the only manufacturer of both valves *and* discs.

Fig. 106-A not only looks better — it proves out better in performance. In any comparison, its long-life, low-upkeep record has always set the standard. That is the true measure of valve cost — and it is the reason why industry's shrewdest buyers will settle for nothing less than Fig. 106-A quality.

The Fig. 106-A "family", with interchangeable parts, provides Globe, Angle, and Check patterns to meet 90% of average valve needs.

Ask your Jenkins Distributor for full information, or write: Jenkins Bros., 100 Park Ave., New York 17.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
SINCE 1864 TRADE JENKINS MARK
Jenkins Bros

SOLD THROUGH PLUMBING-HEATING AND INDUSTRIAL DISTRIBUTORS

For more facts circle 553 on Reply Card

G-E LAMPS GIVE YOU MORE FOR ALL YOUR LIGHTING DOLLARS

How uniform life, light output and freedom from defects in G-E lamps save you money

ELECTRICITY and maintenance labor take 90% of the money you spend for lighting—only 10% goes for lamps. To save on these two big items, you need uniform lamp performance. Uniformity of General Electric lamps is proved by the results of tests on hundreds of thousands of G-E lamps each year.

The above photo shows the life test. The results of this test, like those of hundreds of other tests, checks and inspections are checked and verified by an independent testing laboratory. To the lamp user, this means:

UNIFORM LIFE—You save time, trouble and money. 99 out of 100 General Electric 40-watt fluorescent lamps will last more than a year in single-shift plants (2500 hours service)! 98 out of 100 will still be in service after a year's service in double-shift plants (4000 hours service)!

UNIFORM LIGHT OUTPUT—You get all the light you pay for. Less than 1% of all G-E 40-watt fluorescent lamps are as much as 5% below the published rating of 2500 lumens. And for the past 18 months, these lamps have averaged 39 watts. That's 64 lumens per watt!

UNIFORM FREEDOM FROM DEFECTS—You cut maintenance costs. 99.9% of General Electric 40-watt fluorescent lamps are free from all defects that could affect performance in service.

For more facts on how General Electric gives you more for *all* your lighting dollars, write for the free 16-page Progress Report to Lamp Users: Large Lamp Department, General Electric, Dept. 482 PE-2, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 554 on Reply Card

For more facts circle 555 on Reply Card →

ACCO products

WRIGHT Electric Hoists for Top Production, Easiest Maintenance

WRIGHT *Speedway* Electric Hoists—Frame 1, Frame 2 and Frame 3—are ideal **HOISTS** for handling production materials where the load requirements **ARE** from ¼ ton to 10 ton capacity. Their design includes many advanced **SAFE** operating features. Sound choice of components provides them with **EFFICIENT** balance for smooth running. Parts are designed and built to give **RUGGED** performance with a minimum of care. Plant operating men find them **ADAPTABLE** to almost every type of shop work because of the wide range of speeds, lifts and mountings.

The more particular you are in your selection of hoisting equipment—the more likely you are to choose WRIGHT

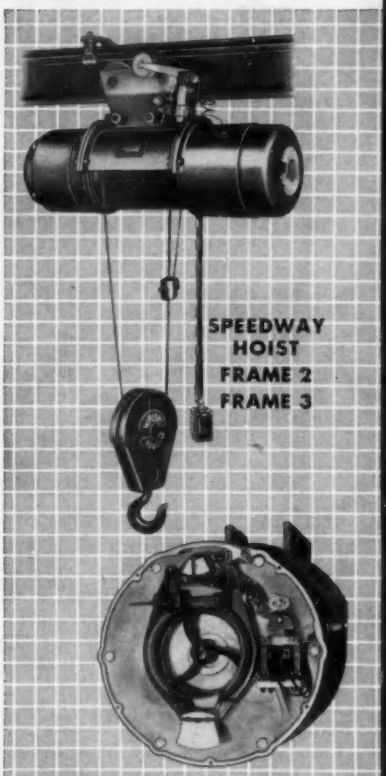
Write our York, Pa., office for any or all of these fully informative bulletins—
Bulletin DH-133B on Frame 1 and 1½ WRIGHT Speedways
Catalog E-54A on Frame 2 and 3 WRIGHT Speedways
Bulletin DH-504 on WRIGHT Electric Roller Chain Hoist

ACCO

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

for Better Value



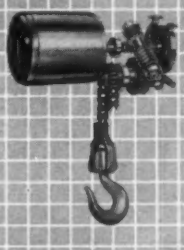
SPEEDWAY HOIST FRAME 2 FRAME 3

MOTOR BRAKE & SOLENOID FRAME 2 and FRAME 3 HOIST
"Nothing to adjust but the cam!"

WRIGHT
Electric Roller Chain Hoist

- ¼, ½, 1 and 2-ton capacities
- Fewest number of wearing parts
- Self-locking, double-worm gear acts as own load brake
- Spring-set, shoe-type motor brake, clam shell type
- Oversize precision ball bearings
- Forged steel-alloy hook, swings and swivels

COMPETITIVELY PRICED



SPEEDWAY HOIST FRAME 1 (also FRAME 1½)

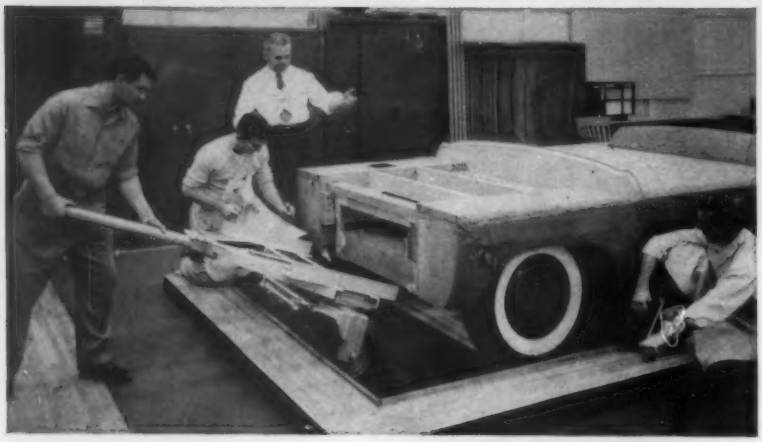
THIS DOUBLE-WORM GEAR ELIMINATES TROUBLESOME LOAD BRAKES

MOTOR BRAKE FRAME 1 and FRAME 1½
"Nothing to adjust but the cam!"

MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

195X clay model Dodge rides on Floating-Hubs



Here's where Dodge brass get their first look at their future entries in the auto sales derby. Foundation for full-scale clay model *(above)* is wheeled into the Dodge styling studios on special dolly equipped with shock-absorbing Bassick Floating-Hub Casters.

Reason for Floating-Hubs

Job of handling these five-ton clay models easily yet carefully goes to dual-wheel Bassick Floating-Hubs for good reason. Their built-in snubbing action—with spring-controlled wheels offset from axles—absorbs shocks and vibration which could damage the models.

Plaster cast can't stop him!

Newest (and happiest) use for Bassick casters we've come across lately is this mobile cart used by 4-year-old Glen Breither.

Pinned in a chest-to-knee plaster cast by a rare hip ailment that takes years to cure, this Bridgeport boy goes places with a smile on the caster-sled his father invented. Bridgeport's Crippled Children's Workshop is now building the same kind of vehicle for other children.

State occasion for casters

Cast iron gate of the Old State Capitol in Baton Rouge, La., rolls open on as ancient a caster (not Bassick, by the way) as you're likely to find in this country.

Photo comes from industrial distributor Dixie Mill Supply Company. Your industrial distributor can check you out on new production methods, latest product improvements, new ways Bassick casters can help you move materials quickly and efficiently.

Caster load capacity

Type of tread, motive power (hand or machine), floor conditions, distance and speed of travel all affect the load a caster will carry satisfactorily.

Floor conditions, for example, are vitally important. On smooth concrete floors, loads roll twice as easily as on rough or littered floors.

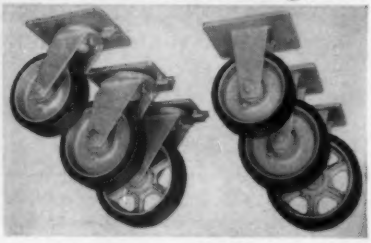
Load capacities given in Bassick catalogs are based on average operating conditions. They're sound, conservative estimates of what the caster will carry through long years of service.

New "brain" fast on feet

IBM's experimental all-transistor calculator features a computing unit that takes half the space—requires only 5% of the power—of a comparable vacuum tube unit.

In keeping with this more efficient headwork is the new electronic brain's footwork. Those are Bassick casters on both the high-speed punching and transistorized calculating units. Couldn't have been a better choice if the brain had picked its own casters.

Casters cut manufacturing costs



Analysts of manufacturing costs have come up with two facts that can save you money! *First:* materials-handling generally runs about 30% of total manufacturing costs. *Second:* materials-handling is the one cost item easiest to reduce.

Bassick casters—like the precision MilSpec casters above—help you cut into the *reducible 30%*. Casters on equipment provide flexibility of economical movement—in *any* direction—immediately. They save wear on floors and dollies.

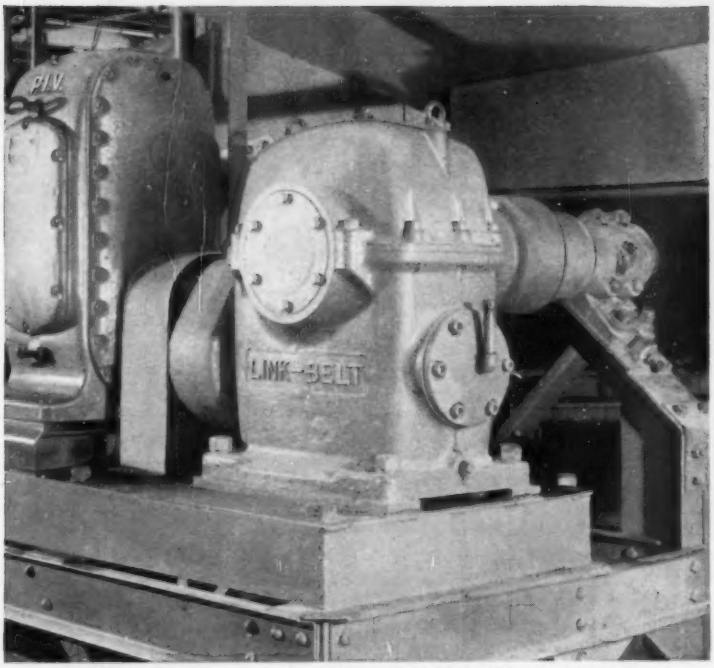
THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
Belleville, Ont.

Bassick
A DIVISION OF STEWART SW WARNER
MAKING MORE KINDS OF CASTERS... MAKING CASTERS DO MORE

For more facts circle 556 on Reply Card

Here's real versatility! LINK-BELT offers you

19 VARIATIONS in WORM GEAR DRIVES



Link-Belt Worm Gear Drive provides compact and economical right-angle power transmission to apron conveyor. Conveyor speed is readily changed by P.I.V. Variable Speed Drive to suit operating conditions.

Meet specific needs from industry's most comprehensive line

WHATEVER the need . . . whatever the speed — Link-Belt Worm Gear Drives can meet your requirements for simple, compact, fixed-ratio speed reduction. With them, you can change the direction and velocity of power . . . match high motor speeds to modern production needs with the least power loss, best possible balance of torque and horsepower ratings.

Choose from a wide selection for fractional or large horsepower requirements. Available with horizontal and vertical housings to permit convenient connections to prime movers and driven machinery.

Single-Worm Gear Drives in ratios from 3.1:1 to 100:1 with output capacities to 97.9 hp.

Helical-Worm Gear Drives in ratios from 26:1 to 540:1 — output capacities to 56.7 hp.

Double-Worm Gear Drives in ratios from 26:1 to 8000:1 — output capacities up to 26 hp and 124,000 inch-pounds torque.

8 of 19 types in the broad Link-Belt line

Type WB—Single reduction, worm below gear, horizontal output shaft.

Type HWV—Helical gear first reduction, worm gear final reduction. Vertical output shaft (up or down).

Type WVS—Single reduction, worm on top of gear, horizontal shaft with screw conveyor flange.

Type HWB—Helical gear first reduction, worm gear final reduction. Worm below gear, horizontal output shaft.

Type DWV—Double worm reduction gear, vertical output shaft (up or down).

Type WV—Single reduction, vertical output shaft (up or down).

Type DWB—Double worm reduction gear, horizontal output shaft.

Type WVT—Single or double reduction overhead conveyor drive.

For full information, consult your local Link-Belt office or authorized stock-carrying distributor. Or write today for Book 2324-A.

LINK-BELT

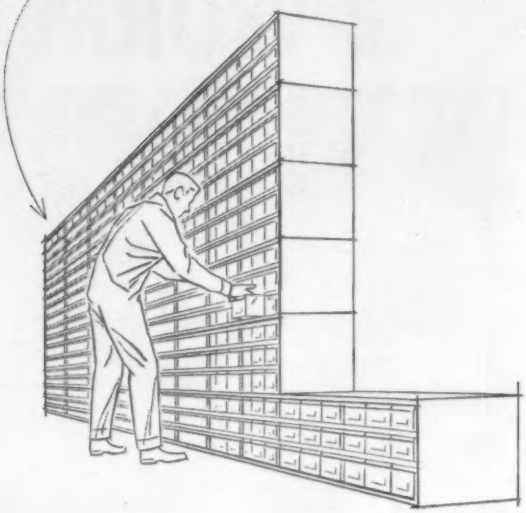
ENCLOSED DRIVES

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,945

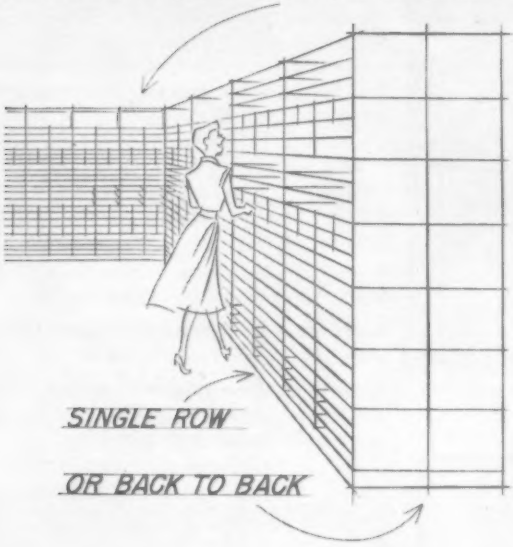
For more facts circle 557 on Reply Card

HOW TO USE HALLOWELL STORAGE WALLS IN MAKING ECONOMICAL STORAGE SPACE

STACK THEM AGAINST WALLS
-AS HIGH AS YOU WANT
-AS LONG AS YOU WANT



USE THEM TO BUILD PARTITIONS OR WALLS



SINGLE ROW

OR BACK TO BACK

SET THEM UP ADJACENT TO MACHINES AND OTHER WORK AREAS TO STORE BOOKS, TOOLS, PARTS, ETC.

Prime Cold Rolled Steel · All Welded and Finished with Baked on Enamel · Interchangeable Drawers · 3 Different Size Drawers Can Be Intermingled in the Same Case · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2093 · Hallowell Shop Equipment Division, Standard Pressed Steel Co., Jenkintown 26, Pa.

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JENKINTOWN PENNSYLVANIA

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For more facts circle 558 on Reply Card

COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Illegal Employment of Minor

A SEVENTEEN year old boy was hired by an employer engaged in welding steel drums purchased from manufacturers as "rejects." One of the drums exploded from the ignition of fumes by a welding torch, the boy was injured and sought damages as an employee under the workmen's compensation statute.

In his defense the employer contended that under the statute welding was not prohibited work for minors. This statute provides in part, "No minor under 18 years of age shall be employed to work in, about or in connection with furnaces, foundries, forging shops or any other place in which the heating, smelting or heat treatment of metals is carried on."

In its decision holding the employer liable for the compensation award under the statute the court said, "Certainly the welding of steel drums comes within the category of 'heat treatment of metals' and the legislature never intended that this work requiring the use of a gas torch and goggles be entrusted to a boy of eighteen years of age." Sullivan v. Komorowski, 106 Atl. 2d 377, New Jersey, June 11, 1954.

Competition By Former Employee

FOR THREE YEARS an employee served the customers of his employer, then left this employment, established his own business and solicited these same customers on his own behalf.

There had been neither a written nor oral agreement precluding the solicitation of this trade, nevertheless the employer sought an injunction from a New York court against this interference with its trade, maintaining that the acts of this former employee were unfair competition.

In its refusal to grant this injunction the New York court said of this former employee's right to use the knowledge he had acquired during his employment in furtherance of sales efforts that were in competition with the former employer,

"In the absence of fraud or in the absence of an express provision in the contract for employment not to go into business or to solicit the former customers of the employer, the employee has a right to embark on his own enterprise to try to build up his own business by direct solicitation of his former master's customers and others.

"In a competitive world, in the absence of fraud or misrepresentation and in the absence of an express contract to the contrary, a former employee should not be restrained from competing with a former employer even though it may result in some injury to his former employer and even though he may use knowledge which he has acquired with his former employer." Addante v. Cinelli, 143 N.Y.S. 2d 244, New York.

Industrial Property Rezoned

IN AN INDUSTRY-ZONED district where property had been held by its owner for over 40 years, no business whatever had been located except a box plant and a concrete block plant.

Upon the establishment of this box plant the residents in that area had protested and the district had been rezoned as residential. In an action by this property owner for an injunction against the enforcement of that zoning ordinance the Florida Supreme Court said in holding the ordinance valid,

"Except for the box plant the property involved is practically surrounded by an area devoted principally to single family residents. Since the date the property was zoned industrially until the box plant was built over objections which caused the zoning change, the only development in adjacent areas has been for residential purposes." Atlantic Coast Line R. Co. v. City of Jacksonville, 88 So. 2d 570, Florida, December 12, 1953.

Smoke Ordinance Valid

CONVICTED OF THE violation of an anti-smoke ordinance of Kingsport, Tennessee, a cement plant appealed, contending that the adoption of this ordinance was not authorized by the city's charter.

The ordinance was, in part, "The emission of dense smoke within the City of Kingsport from the smokestack of any roller, derrick, railroad, tar kettle, internal combustion engine or open fire or from the stack or chimney of any building, roundhouse or premises except for a period of or periods aggregating nine minutes of density No. 4 smoke as defined by the Ringelmann Chart, or six minutes or less of a density in excess, in any one hour, is prohibited."

In sustaining the validity of this ordinance the Supreme Court of that state said of the authority of the city to adopt such an ordinance, "It is generally recognized that whatever is injurious to human health or detrimental to health or whatever deprives the inhabitants of pure uncontaminated and inoffensive air constitutes a public nuisance. The knowledge is common that smoke discharged from the numerous establishments in crowded urban centers, particularly in industrial and manufacturing communities, is carried over a wide territory and that when dense, falling soot renders the air disagreeable and injurious to breath, damages clothing, textiles and various other articles in shops, stores and residences and otherwise produces inconvenience and annoyance to the inhabitants.

"Accordingly the sound judicial view is that the emission or discharge of dense smoke in populous communities is a public nuisance and may be regulated by virtue of the police power." Penn-Dixie Cement Corp. v. City of Kingsport, 225 S.W. 2d 270, Tennessee, December 17, 1949."

Air Contamination Ordinance

CONVICTED OF THE violation of an anti-smoke provision of the Health and Safety Code, a California plant appealed, contending that the law established no ascertainable standard of guilt and was fatally uncertain.

This provision is, "A person shall not discharge into the atmosphere from any single source of emission whatever, any air contaminant for a period or periods aggregating more than three minutes in any one hour, which is as dark or darker in shade as that designated as No. 2 on the Ringelmann Chart as published by the United States Bureau of Mines."

In refusing to recognize this contention as valid the California court said of the Ringelmann Chart, "It is a white piece of paper divided into four sections numbered from 1 to 4 and each about 5¾ x 8¾ in. in size. On each of these sections is printed a series of intersecting heavy black lines of uniform width for each section, with lines growing progressively wider from section 1 to section 4, until on section 4 the black covers much more than half of the surface. This chart refers to Bureau of Mines Information Circular No. 6,888. The chart is to be posted at a distance of 50 ft from the observer. When so posted the black lines and the white spaces merge into

COURT DECISIONS

each other by a process of optical illusion so as to present the appearance of a series of gray rectangles of different color density, No. 4 being the densest.

"Estimates of the density of smoke may be made by glancing from this chart so disclosed to smoke and picking out the section of the chart which most nearly resembles the smoke. This mode of measuring the density of smoke has been in use, it appears, for over 50 years. It affords a reasonably certain mode of determining and stating the density and opacity of smoke and we think that the statute adopting it is not lacking in certainty." People v. International Steel Corp., 226 Pac. 2d 587, Cal., January 25, 1951.

Invention In Combination Of Old Elements

IN AN INFRINGEMENT suit brought by the patentee of an oil filter the defense was made that the patent claimed to be infringed was void for lack of invention.

The description of this invention by the Federal court was in part, "The filter element consists of four parts. It is cylindrical in shape and extending from end to end through the center of the element is a perforated hollow rigid core member. Next to this rigid hollow core is a compact mass of what is described as 'suitable filtering material, preferably a mixture of cotton waste and wood shavings.' This in turn is encased within a porous knitted sleeve of fabric and this knitted fabric is then drawn around the end of the cylindrical mass and fastened or secured to the rigid core by circular plugs. These plugs telescoped with a tight friction fit into each end of the core.

"As the casing is knitted and not woven and functions like all knitted material, its openings gradually become larger, permitting more and more of the solids in the oil to pass through and lodge in the interior filter mass and further fill up its voids and interstices."

Of the defense that these features were well known and lacked invention the court added in conclusion, "It does not appear that any of the prior art utilized or comprehended the unique combination present in this device. This combination presented a growth factor accompanied and supplemented by the expanding of openings in a filter cloth, to allow the growth to continue and to prevent slicking over until maximum utilization of the interior filter mass had been accomplished. Hence we think that invention was here present." Winslow Engineering Co. v. Smith, 223 Fed. 2d 438.

Malicious Interference

UPON THE termination of a contract between an individual doing business under a trade name and a corporation of the same name, the corporation directed the post office to deliver all mail addressed to this name to the corporation. As a consequence orders and checks intended for the individual were received and retained by the corporation.

In the suit brought by the individual doing business under this trade name, in the Federal court in Alabama, the judgment against the corporation was appealed. In the recent decision of that appeal the court said,

"The corporation cannot stand on the proposition that their avowed objective of obtaining the profits on future orders was of such transcendent importance that it gave them the privilege of using fraudulent means and subjecting the individual to the annoyance and losses naturally incident to interrupting and at least delaying the mail unmistakably directed to him at his business address.

"The jury could well have believed from the surrounding circumstances that the corporation's actual objective was even less commendable—to coerce this individual to go back to work for them on the latter's terms by disrupting his business. It is abundantly clear that a jury could find that the corporation's conduct was unjustified even by the rough and tumble ethics of the market place." Kelite Products v. Binzel, 224 Fed. 2d 131.

Waiver of Time for Performance

AFTER A CONTRACT had been made for the manufacture of an automatic spraying machine by a plastic novelty plant, the manufacturer suggested to the plastic plant owner the addition of a centrifugal system of paint disposal. The plant owner agreed and at the same time paid $2,100 as part payment for the unit. From time to time other changes were made with a consequent extension of the delivery date.

When on a Saturday the machine was finished and ready for demonstration and delivery the manufacturer asked for a postponement until Monday, which at the request of the plant owner was extended to Tuesday. On Monday however the plant owner rescinded the contract on the ground of delay, and demanded the return of the $2,100 paid as partial payment.

In its decision, the court said, in denying a recovery by the plastic plant owner,

"Where a contract calls for the manufacture and sale of an article as yet non-existent, the time specified for delivery is less likely to be considered of the essence. The reason is that in such a situation there is a probability of delay and the loss to the manufacturer is likely to be great if the buyer refuses to accept and pay because of non-compliance with strict performance."

Then of the purchaser's consent to the postponements the court concluded, "It sanctioned the manufacturer's efforts to finish the machine even though the day stated in the original agreement for final performance has long since passed. By its conduct it waived its right to strict compliance with the provisions of the contract as to time for performance." Bradford Novelty Co. v. Technomatic Inc., 112 Atl. 2d 214, Connecticut, March 1, 1955.

Patentee's Right To Damages

EXCLUSIVE LICENSES to manufacture and sell patented windshield wiper parts were granted by the patentee to a manufacturer. When a competitor engaged in the manufacture and sale of windshields and their parts undertook the sale of its products under an agreement with distributors requiring them to restrict their purchases of products of this character to those of that company, the patent owner sued for triple damages under a provision of the anti-trust laws that state,

"Any person who shall be injured in his business or property by reason of anything forbidden in the anti-trust laws may sue therefor ... and shall recover three-fold the damages by him sustained and the cost of suit including a reasonable attorney's fee."

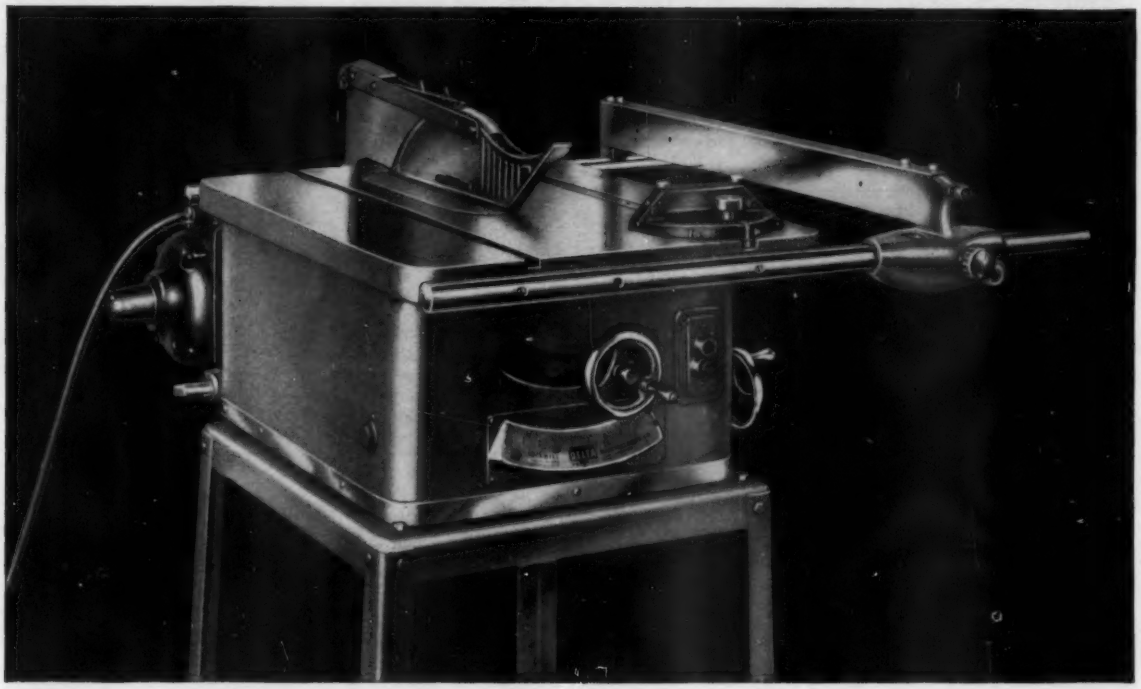
In its denial of the right of the patentee to maintain his action under these circumstances the court said,

"Is a patentee who has granted to another an exclusive license for the term of the patent upon a royalty basis a 'person ... injured in his business or property' so as to enable him to recover treble damages for loss of royalties on sales that might have been made by its licensee, save for the anti-trust violations of another? We hold he is not. Undoubtedly such persons suffer some financial loss when anti-trust violations are directed against corporations in which they have an interest. But not every financial loss due to an anti-trust violation, however remote, gives a right of action." Productive Inventions v. Trico Products, 224 Fed. 2d 678.

ROCKWELL-BUILT

new DELTA

10" tilting arbor bench saw



Here's the ideal saw for plant maintenance and shipping department use—the all new Delta 10" Tilting Arbor Bench Saw! It's an all-purpose "second" saw that gives you all these features—at small saw cost:

EASY TO MOVE—Take it right where it's needed. Eliminate expensive materials handling, save costly outside help on maintenance work.

BIG CAPACITY—Has full 10" capacity (cuts stock to 3⅛" deep, rips to the center of a 48" panel) for production line cutting in your crating department.

RELIABLE ACCURACY—Real precision for accurate cuts combined with rugged durability for trouble-free service.

SAFETY—Shielded drive mechanism assures maximum protection for both operator and saw. A new push button switch prevents accidental starting, gives fast emergency stopping.

See this great new Delta 10" Bench Saw demonstrated —compare it! Get all the facts and make up your own *mind! Your Delta Dealer is listed under "TOOLS" in the classified pages of your phone book. Send the coupon for full details*— today!

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PERFORMANCE VERIFIED / by acid test

Even before a Powell Valve is made, it must pass the acid test. For quality control of Powell Valves begins not with manufacture—but with the very materials which go into Powell Valves.

Constant laboratory control is one of the many ways we make certain that Powell Valves will give dependable flow control. Another is the final step of manufacture of these precision-built valves: *every Powell Valve is subjected to an actual line test.*

Because of Powell's painstaking quality control, valve repair is cut to the minimum and plant shut down through valve failure is substantially reduced. Records of performance the world over prove it.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our COMPLETE *quality line* which has PERFORMANCE VERIFIED.

The Wm. Powell Company, Cincinnati 22, Ohio . . . 110th YEAR

PERFORMANCE PV VERIFIED

FIG. 3003 WE—Steel Gate Valve
For 300 Pounds W.S.P.

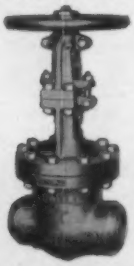

FIG. 11365—Steel Pressure Seal
Horizontal Lift Check Valve
For 1500 Pounds W.S.P.

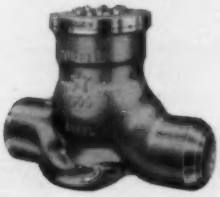

FIG. 11323—1500-Pound Motor
Operated Steel Pressure Seal
Gate Valve.

POWELL VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES.

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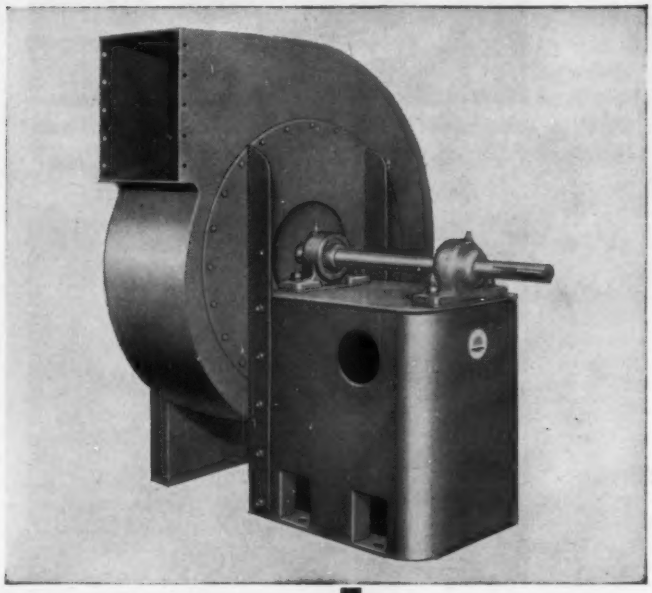
NEW FEATURES! HIGHER EFFICIENCIES! NEW "3-IN-1" DESIGN!

AMERICAN BLOWER SERIES 106 INDUSTRIAL FAN



Series 106 Industrial Fan

Certified ratings! Pressures to 18" w.g.! Volumes to 125,000 cfm! Heavy construction! Choice of 3 special-duty wheels! You get all these features, and many more in American Blower's new Series 106 Industrial Fans.

Available in 16 sizes, each with a high efficiency rating. Series 106 fans offer a wide range of optional accessories and construction features to meet standard or special specifications – *or* you can buy it in 7 sizes as an efficient, heavy-duty "packaged" industrial fan, complete with motor, V-belt drive and weathertight running-gear enclosure.

Get complete data from your nearest American Blower Branch Office, or write for Bulletin 5306-H.

CERTIFIED RATINGS

AUTHORIZED BY N A F M

Certified Ratings

CFM

Choose the wheel to fit the duty

Air Handling – for efficient handling of air, fumes, or gases – either clean, or containing light concentrations of dust or materials.

Material Handling – efficiently handles air or gases containing granular material – dust grain, exhaust from buffing or grinding wheels.

Long Shavings – specially designed for conveying or handling air or gases containing long stringy material – wood shavings, fibers, alfalfa.

American Blower products serve industry

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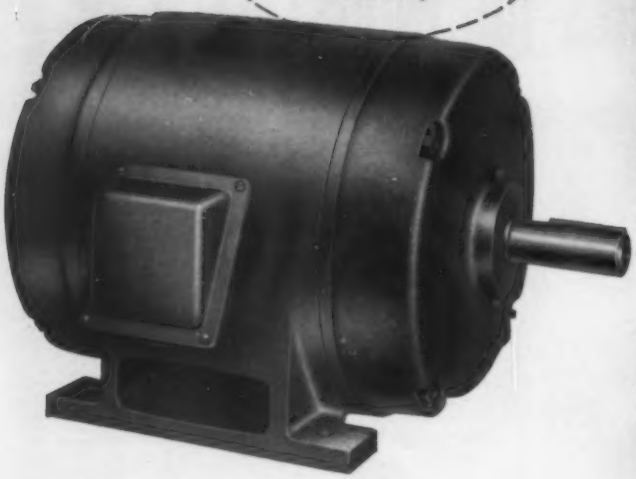
ELECTRIC MOTORS
... the choice of leaders in industry

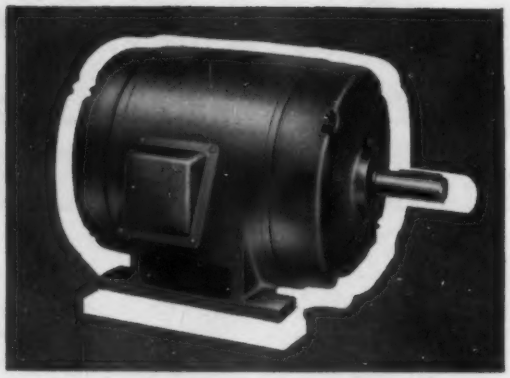


You get better performance with these Wagner DP Motors

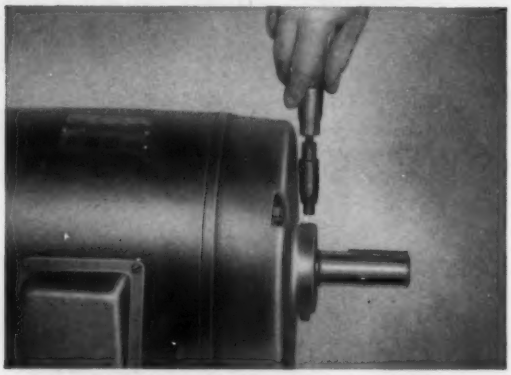
Wagner DP motors are *doubly protected* by (1) rugged, corrosion-resistant cast iron frames, smoothly rounded so that no moisture can collect on them. Motor feet are cast as an integral part of the frame for maximum strength and rigidity. (2) Enclosures on the DP motor are completely drip-proof—virtually splashproof. Air intakes are located at the bottom of the endplates and air outlets are located at the base of the frame—one on each side.

Although engineered to meet the re-rated NEMA specifications which call for more power in smaller frames, the same high quality and long life performance that have made Wagner Motors "the choice of leaders in industry" for many years has of course been retained.

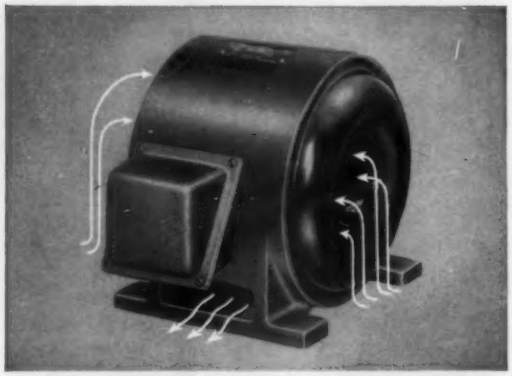
Full information and principal dimensions are given in Bulletin MU-202. Write for your copy today.



MORE POWER IN SMALLER FRAMES The Wagner DP Motor packs more power in a smaller frame and this smaller size means ease of handling and stocking ... less space required for installation.



CAN BE RE-GREASED FOR LONGER LIFE This motor will operate for years without regreasing ... bearings are completely enclosed ... however, provisions have been made for adding lubricant and for the removal of old grease in cases where re-greasing is necessary.



COOL RUNNING Specially designed baffles direct cooling air from the blowers through the motor and provide protection for the stator windings. Blowers are an integral part of rotor ... and move large volumes of air without noise or vibration.

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MBB-4

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

For more facts circle 562 on Reply Card

Hall Industrial Water Report

VOLUME 4 FEBRUARY 1956 NUMBER 1

New Plant or Expansion of Old One

How well you engineer your plant services may determine whether you get continuous production or operation like a paralytic centipede. Water for steam generation, for cooling, for use in process—and water leaving the new plant—*can* be designed to be the least of your troubles. But the best time to listen to someone who knows how to make water behave is while you are still in the planning stage.

It's Cold Out There!

Frequent subzero weather with temperatures as low as −45 at the site of a proposed new plant in Minnesota was an important factor in the choice of a heating system by a large mining company planning to process iron from taconite. Space heating constituted about ninety percent of the load. Buildings to be heated were widely scattered over a large area.

When a high-pressure hot-water heating system was decided upon, water treatment had to be considered from two angles: protection of the boilers and protection of the heating system. Hall Laboratories was invited to study the raw water available and to recommend treatment.

Water could be obtained from either of two intakes from the surface supply; samples from both were analyzed. The types of metal used in construction of the heating system were determined, zeolite softening and deaeration of makeup, chemical conditioning and proportional chemical feeding facilities were thoroughly discussed in a survey report by Jack Summerville, Hall staff engineer. After completion of the survey report, it was learned that well water might have to be used temporarily because of delay in completion of the surface supply pipe line. Because the well water does not have as desirable a composition as the surface water, Hall urged that the pipe line be completed as quickly as possible and recommended that the well water be zeolite softened even though regenerations would be much more frequent.

The boilers have now been boiled out and, on Hall's recommendation, acid cleaned to insure thorough cleanliness of the heater surfaces. The plant is beginning operation.

Water is your industry's most important raw material. Use it wisely.

Faith Justified By Performance

When an Eastern paper specialty manufacturer decided to build a new plant in California, the chief engineer wrote: "In dealing with the problem of water supply, water treatment, and so forth, we felt it desirable to call in Hall Laboratories, not only because of the past relations which have existed for so many years, but because we intend to retain Hall Laboratories as consultants for our California plant."

To start the survey, Hutcheson Page, of Hall's New York office, conferred with the plant management about the purchase of their boiler. After extensive checking of specific requirements, a factory-assembled, water-tube boiler was ordered.

Hall Laboratories already had experience with the water in the chosen locality in California. This provided a sound basis for recommending the proper pretreating equipment.

Because of the potential cost of water supplied from a city aqueduct, the plant wished to use water from its own wells. Hall recommended pretreatment equipment flexible enough so that it could properly prepare any of the various waters available for future use in any standard type of boiler operating at 250 psi. A salt regenerated cation-anion exchange system was suggested and accepted.

The plant also has followed other recommendations made by Hall for internal boiler-water treatment as well as treatment of steam by Hagamin.® A recent service report from Hall field engineer Orville Morrow states that the plant is maintaining very good treatment control.

South of the Border

Hall Laboratories pursues the "Good Neighbor" policy by helping many clients in South America and the West Indies on a consulting as well as on a continuing service basis.

A client in Maracaibo planned to install an additional boiler plant adjacent to the one already serviced by Hall Laboratories. Hall helped the plant select evaporator feedwater pretreating equipment, chemical feed pumps, pH meters, and helped plan the laboratory layout prior to start-up. Then Jack Summerville of the Hall headquarters staff made a trip to Maracaibo to help start operations, with special attention to their hot lime-gypsum reactor, pressure filters, hot zeolite softener, evaporators, and the treatment of their feedwater-condensate and boiler-water systems.

Continuing satisfactory conditions have been maintained by correspondence between the plant and Pittsburgh headquarters, supplemented by an annual consulting trip by Hall staff engineer, Alex Henricks.

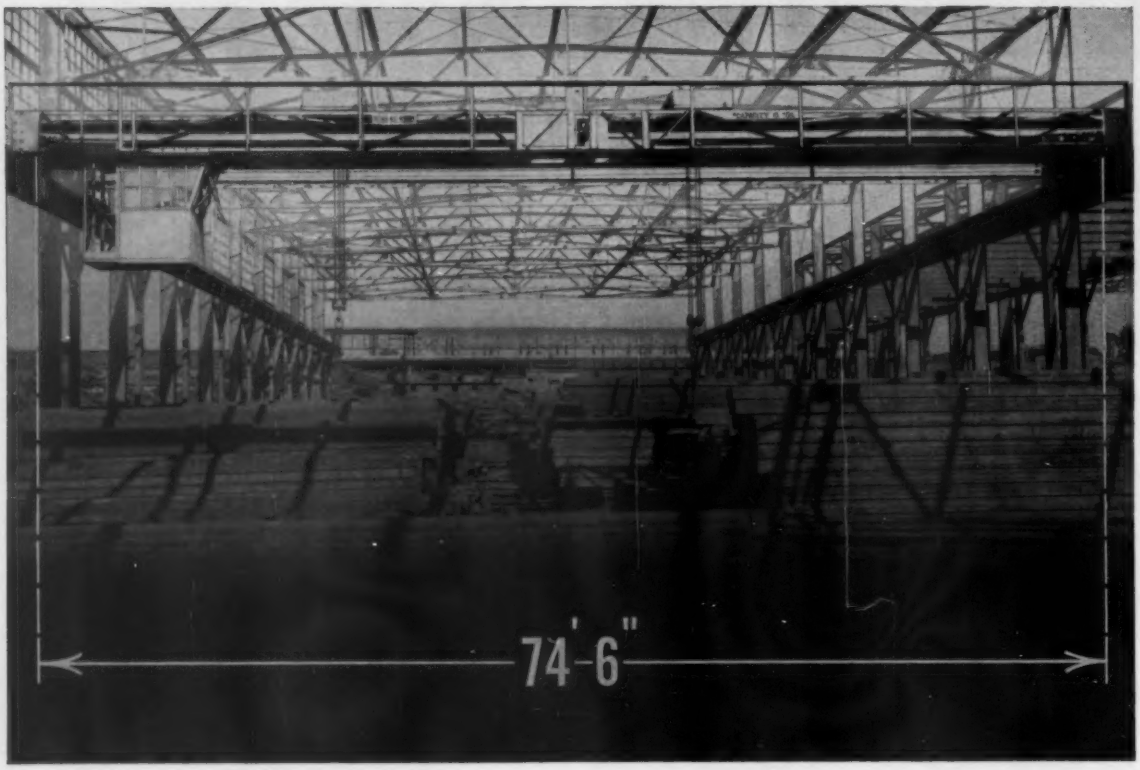
Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information write, wire or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

Hall Laboratories, Inc.—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 563 on Reply Card

TAKE IT UP WITH R&M HOISTS-CRANES-WINCHES



BIG R&M CRANE MOVES STEEL FOR KILROY

R & M built this big 15-ton crane to lift and move structural steel—never a dainty, packaged commodity—with two-handed flexibility. Two 7½-ton R & M Type "F" Hoists, independently controlled from the cab of this double-girder, five-motor crane, eliminate dangerous load-balancing.

Maximum bridge deflection (loaded), ½". End truck length, 15' 2", wheelbase, 11'. Bridge speed, 250 fpm maximum. Bridge control, six-step variable speed. Bridge brake, foot-controlled hydraulic. Hoist lift, 20'. Lift speed, 20 fpm. Trolley control, four-step variable speed to 125 fpm. Total crane weight, 60,000 pounds. User, Kilroy Structural Steel Company, Cleveland, Ohio.

Pictured at right—45-foot span, 20-ton capacity R & M crane with 5-ton auxiliary hoist. Standardized cranes in single or double I-beam types available quickly in 20 to 65-foot spans; capacities to 10 tons.

BRING YOUR R & M HOIST DATA FILES UP TO DATE. SEND FOR FREE BULLETIN

☐ Have representative call ☐ Send Bulletin No. 825-B

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Nicholson *steam trap* simplicity *gives you*

peak performance, low-cost maintenance

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Nicholson simplicity of design and operation pays off big in any plant . . . in peak performance of steam using equipment . . . in easy, low-cost maintenance. Nicholson traps offer the most effective method for discharging condensate and air from steam lines.

- **one moving part—big husky bellows.**
- **positive shut-off—no waste of steam.**
- **high capacity—effective use of large orifice.**
- **each unit service tested—with steam.**

When less than the best won't do, specify Nicholson.

NICHOLSON

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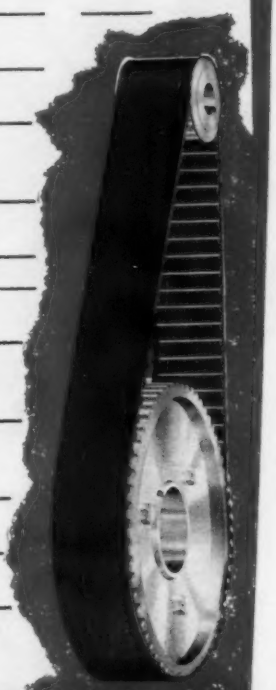
Make your own comparison of the

Gilmer THE ORIGINAL "TIMING"® BELT DRIVE

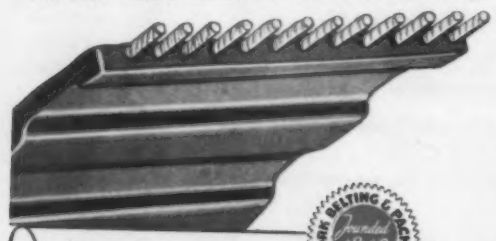
versus other forms of Power Transmission

	GILMER "TIMING" BELT DRIVE	FLAT BELTS	CHAIN	V BELTS	GEARS
1. Can it transmit 1/100 to 300 HP without slippage... and without lubrication?	Yes				
2. Does it eliminate noise and vibration caused by metal-to-metal contact?	Yes				
3. Does it operate at maximum efficiency, indefinitely, without take-up?	Yes				
4. Does it make possible very compact, short-center drives of ratios up to 15-to-1?	Yes				
5. Does it eliminate need for initial tension, permitting all the drive's tension to be used effectively... and reducing bearing wear?	Yes				
6. Can it operate satisfactorily at peripheral speeds above 12,000 FPM?	Yes				
7. Does it maintain constant angular velocity?	Yes				
8. Is its weight very low in proportion to its strength?	Yes				
9. Does it make possible precise "timing", without appreciable backlash, between two or more widely separated shafts?	Yes				
10. Does it eliminate the expense and added weight of lubricants, lubricating devices and covers?	Yes				
11. Does it save so much power as to sometimes permit use of lower-powered motors?	Yes				
12. Does it have unusually long, maintenance-free service life?	Yes				



WHEN PLANNING A DRIVE, CONSIDER ALL FIVE!

NEOPRENE-ENCASED, CABLED STEEL WIRE GIVES THE BELT GREAT STRENGTH WITHOUT BULK



Naturally, these questions are phrased to emphasize the unique *combinations* of features provided by the "Timing" Belt drive. Question 1, for example, might have been divided into two separate questions. But this would not point up the important fact that the "Timing" Belt drive is the *only positive drive requiring no lubrication.*

Certainly, the four older types of drives will always have their special places in the power transmission picture. The important fact is that the plant engineer, like the design engineer, now has at his disposal a *fifth* type of drive ideally suited to so many applications that more than a million are now in use. Write, or ask your NYB&P Distributor for your copy of the Gilmer "Timing" Belt Stock Drives Manual. You will find him listed in the yellow pages of your phone book.

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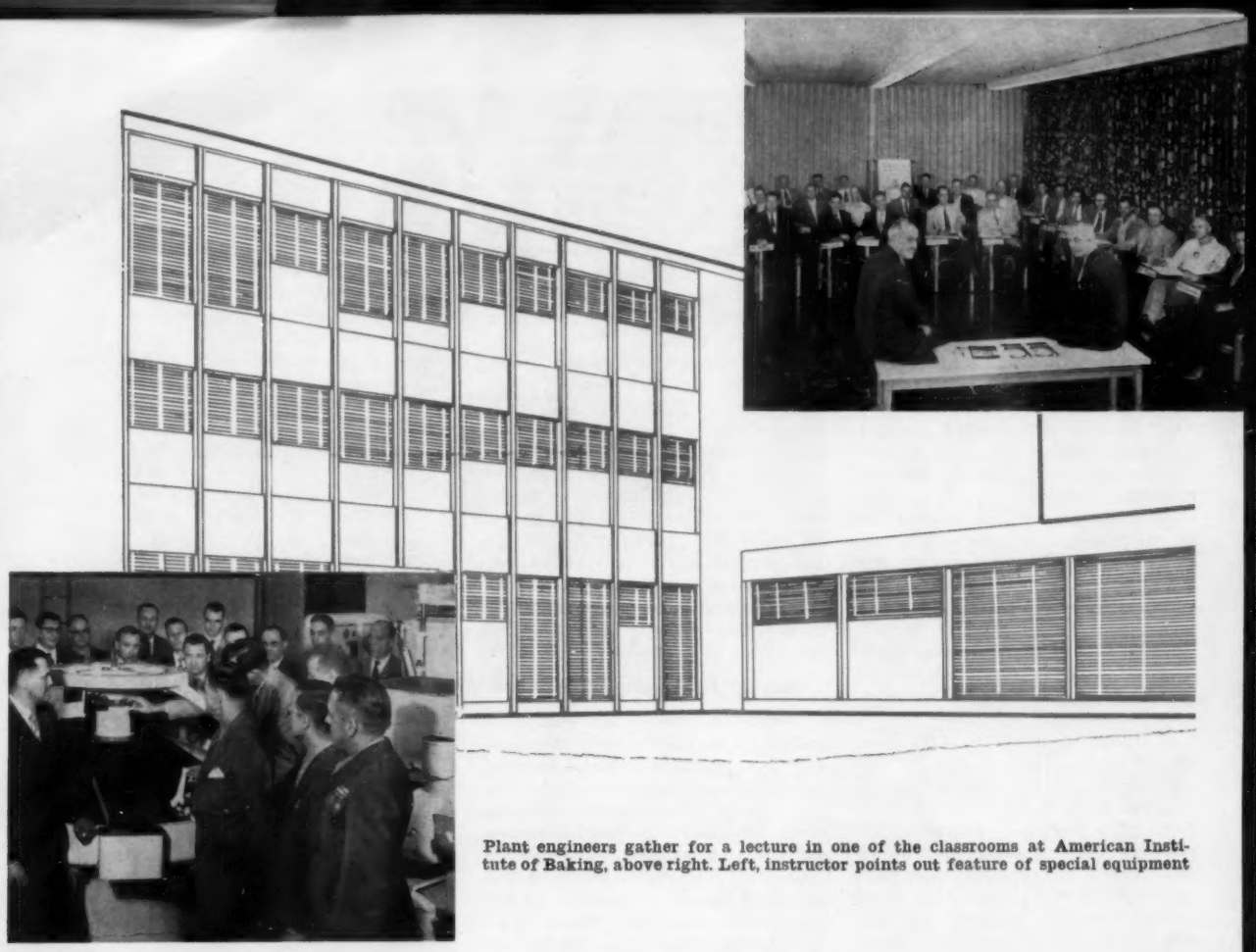


Plant engineers gather for a lecture in one of the classrooms at American Institute of Baking, above right. Left, instructor points out feature of special equipment

Plant Engineers Don "Mortar Boards"

Return to Classroom Updates Them on Maintenance

EDUCATION IS but one facet of the activities of the American Institute of Baking in Chicago, Illinois, but it is a very important one. And when theory and practice meet in classroom, shop and laboratory of the Institute's School of Baking, not only the baker, but the bakery plant engineer, get special attention.

Along with various courses in baking science, the School offers courses under the general heading of bakery equipment maintenance. Instruction in the operation and upkeep of all major types of bakery equipment, in addition to discussion of boiler equipment and building maintenance is given. Emphasis is on developing a well planned and coordinated program that will prevent costly delays in production or man hour losses.

Sanitation and safety are also discussed as essential to the overall maintenance program and even human relations as a factor in the successful functioning of a system are considered.

All courses are conducted in the Institute's own school. Facilities include four classrooms, equipped with funds donated by both companies and individuals; three bake shops and a science laboratory, all on one floor. Equipment used in laboratories and bake shops is sometimes donated, but, more usually, is lent on consignment by the manufacturer and replaced every few years. In this way, students attending the Institute classes are able to familiarize themselves with the newest types of equipment available.

At a recent short course in bakery equipment maintenance, nearly 40 lectures or panel discussions were held. Subjects included maintenance, job scheduling, communications, rodent and insect control, wrapping materials, storage of ingredients, accident prevention, and work simplification.

That the plant engineer in a bakery has to know his product was pointed out by Peter Pirrie, engineering editor of Bakers Weekly, in a lecture on preventive maintenance given during the course. If the product is not perfect he must be able to judge where in the process something went wrong, what was wrong, and the cause. Slides of a faulty product were shown, the diagnosis made and the remedy suggested. Frequently, Mr. Pirrie pointed out, the trouble was due to poor maintenance of equipment.

In another lecture during the same course, inventory and spare parts control was discussed in detail by Charles Kenkman, Jr., of the Institute's School staff. As a start toward establishing a control system or devising a new one, he suggested the use of a history card on which each piece of equipment for which the plant engineer was responsible, would be itemized. Cards could also be made for the building.

Spare parts should be ordered with the following considerations in mind: what is the nearest source of supply; how long it will take the order to reach your shop; are you equipped to make

emergency repairs; and how important is the machine for continuous production.

Effective inventory control insures an adequate, but not excessive, number of spare parts on hand at all times.

In addition to regulating the number of spare parts, inventory control is concerned with the systematic location, storage and recording of these parts for the most efficient operation at the minimum cost.

"Tools" that can be used to achieve the control include an effective stockroom location and layout; adequate storage facilities; a system of material identification; and accurate inventory recording procedures.

To determine whether to centralize or decentralize the stockroom, the plant engineer should consider the size and type of the plant. In a modern one-story plant, a centralized stockroom generally gives most benefits since it uses less space; reduces duplication of stock; reduces down time by faster repairs; and requires less operating personnel.

In a multi-story type plant the benefits of a centralized stockroom will probably be offset by the amount of time lost going to and from the stockroom for a routine or emergency repair job. Major precepts upon which the selection and installation of storage facilities may generally be based include allowance for easy, quick and sure receipt, storage and dispersement of material; protection against damage and deterioration; ready location and identification of parts; and provision for selection of parts in stock longest, first.

Other lectures given, designed to help the bakery plant engineer, were on inspection and lubrication schedules; how to avoid costly breakdown of equipment; job scheduling; pan maintenance; and bakery flour handling equipment.

In his talk on setting up inspection and lubrication schedules, Fred Leason, plant engineer at the Interstate Bakeries Corporation, Chicago, Illinois, emphasized the necessity for observing manufacturers' recommendations for lubricating machinery. When a system is set up, a machine record card should be made for each item of equipment in the plant. This card should show the machine name, serial number, company number, location, where and when it was purchased, where parts are to be ordered, what spare parts are to be carried in stock and any special information about the machine.

Motors and special drives should be listed by horsepower, voltage, frame size, speed, size of pulleys, v-belts etc. On the reverse side of the card the oiling and greasing schedule, repair and adjustment schedule and the cleaning schedule should be listed. The cards can then be flagged or indexed on a time basis so that work orders can be issued at the proper intervals. In the average small plant, to eliminate paper work, daily and most weekly adjustments and lubrication should be part of the regular routine of the maintenance man.

Once a system has been established, a constant follow-up must be made. This would include a personal check up by the plant engineer and the respective operators of all equipment.

Breakdowns should be analyzed for the cause; lubrication points should be checked for signs of heat, rust or excessive wear. Shafts, pulleys, gears and sprockets should be examined for misalignment and undue pressures. Where necessary, schedules and lubricants should be changed to prevent reoccurrence of the trouble.

Handle Equipment Correctly

Interest in pan maintenance must start with the careful evaluation and selection of the most suitable material for the various types of pans to be used in a bakery. Having selected the material, Ed Leedy, Lockwood Manufacturing Co., Cincinnati, Ohio, told his class, the "built in" features of pan sets must then be considered. In pan maintenance there was only one serious problem which could not be "designed away" or controlled by the pan manufacturer. This was the problem of mechanical damage and deformation to pans resulting from improper handling. Pans could only be preserved in their original form and shape through the establishment and rigid enforcement of proper handling methods.

In discussing pan sanitation, Mr. Leedy pointed out that pans with workmanship and features which are less likely to collect soil should be selected. In every pan sanitation program the use of pan glaze was an important tool. Each cleaning cycle should be followed by an application of glaze which would provide a new surface on the inside of the pan, sealing off imperfections occurring through use.

Unless a bakery found it necessary to clean from 2,000 to 2,500 pan sets a week, the cost of the required space, equipment, labor, utilities, chemicals, oven time and overhead expenses would exceed the cost of having the job done commercially. In addition, there would be the hazard of etching the pans during the cleaning process, creating foreign odors and a steamy atmosphere which have no place in a bakery. Mr. Leedy suggested that bakers should take themselves out of the pan laundry business and turn it over to the experts. They could not afford to do otherwise.

The need for good preventive maintenance schedules and for scrupulous cleanliness was emphasized in lectures on the maintenance of make-up and mixing equipment.

The department of sanitation at the Institute was organized in 1945 at the request of the baking industry, and for two years its function was purely educational, too. Since then, its scope has been widened to offer various services to the baking industry.

Cooperation between the Institute and five allied associations, resulted in the formation of a committee on sanitation standards for bakery equipment.

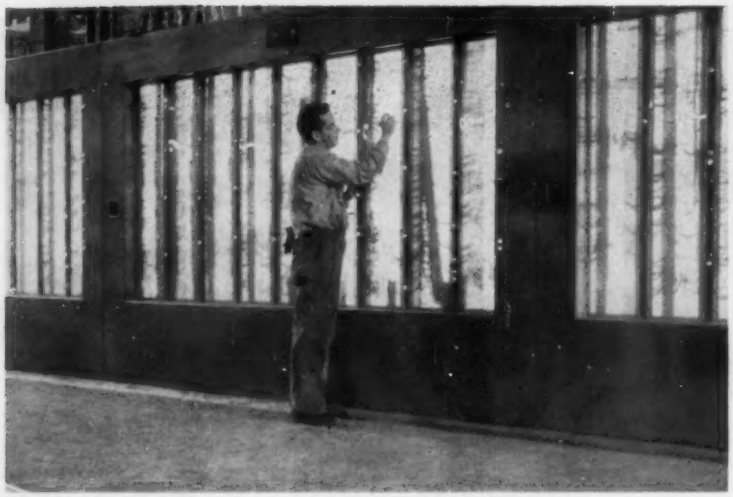
One piece of equipment that was virtually redesigned was that used for handling flour. Typical equipment of pre-standard days sometimes contained hundreds of nuts and bolts, making it a time-consuming, tiresome, or sometimes impossible job to dismantle and clean. Spot welding too, often prevented the equipment being taken apart at all for cleaning purposes.

New standards now specify greatly simplified design for flour handling equipment; machinery that can be disassembled by hand, or with only the simplest tools.

Introduction of these standards has made it possible for the bakery plant engineer, when ordering new equipment, to specify machinery that complies with these standards.

View of the model bakery at Institute in which some of the classes are held

Apart from its educational activities, the original aim for the Institute—to carry on research—continues. Research projects are sponsored by individual companies and by special grants from associations or agencies, on condition that all results must be made available to the entire industry.



Electrical Troubles
Pinpointed on Wired Drawings

PLATING OF automobile bumpers is a big scale operation at the new Chevrolet plant in Livonia, Michigan. In full-scale production this work will be handled by three straight line plating machines; each is 535 ft long, 17 ft wide and 25 ft high. The process consisting of cleaning, washing, rinsing and plating is carried out in 31 steps.

Plating equipment and tanks are located on two levels and cover an area equal to two football fields. On the first level is found accessory equipment such as pumps, heat exchangers, filters, air washers, storage and mixing tanks.

The second level contains plating machines and plating tanks, m-g sets, electrical control equipment and blowers. As a matter of interest, plating and storage tanks hold a volume equivalent to 109 railroad tank cars.

Miles of Wiring

Heart of the automatic plating operation is an "electronic detective" which bears the trade name of "Electrographic Detector System" and uses 710 miles of wiring to keep a finger on approximately 25,000 control points along the electric lines. Upright illuminated panels carry a complete diagram of the electrical layout controlling each plating machine.

The system makes use of a schematic diagram printed on glass cloth for dimensional stability. This is placed between two sheets of plastic, which are mounted in a metal frame. Temperature and humidity will not affect the size of the drawings.

At each point on the drawing, where a terminal is represented between contacts on the various pieces of equipment, a hole is drilled through the plastic sides and the diagram.

A self-tapping screw goes into the drilled hole at the back side of the drawing. A wire is connected to this screw with its opposite end tied to the control cabinet terminal that is represented on the drawing by the point to which it is connected.

Terminals on the schematic drawing wired in this manner, result in a live or wired-in diagram. Any tests at these points with a test probe will give a true indication of the state of the control circuit at any given time. Each step in the cycle of the machine is shown in the same sequential pattern on the schematic diagram with each successive step appearing below the previous step.

A space is left between each step for adding any circuit which might be required because of a change in the machine cycle. The drawing is easily removed for alterations. None of the connections on the back side has to be touched. Changes are made with either pencil or India ink on the drawing. At any place on the diagram designating the addition of new terminals, a new hole is drilled through the plastic and an electrical hook-up is made as mentioned.

Along the right side of the diagram, there is a vertical alignment of white lights. A name at each white light identifies it with the particular step on the diagram. These lights are mounted opposite their respective steps and serve to indicate which particular part of the circuit is controlling the machine at any time during the machine cycle.

With the "Ground Test" selector switch turned to its "Test" position, a connection is made from the right hand common through the selector switch, through the test lamp, to the test probe. At the same time the right hand common is grounded making it safe to touch the test probe. When a probe is touched to a test point and the test lamp lights, the contacts between the left hand common and the test point are closed.

In checking out the cycle-start circuit, the test probe is applied to a series of successive test points. The continuity of the circuit is established by the indicating light. There is an indication of trouble when this light does not go on.

The trouble lies between the last point that brought about the lighting of the lamp and the point where it failed to light. Between these two points, one of three things can be wrong: a wire from the first terminal to the contact may be off, a wire from the second terminal to the contact may be off, or the contact itself may be either bad or open.

In addition to the white lights, the panel is equipped with colored lights. These tell an observer when operational steps are properly completed while the white lights go on and off along with the sequence of operations. It might be suspected that when a colored light does not go on, its filament is burned out giving a false indication of trouble. This can be readily checked by pressing on the lens. If the lamp lights, trouble exists in the circuit. This type of indicating lamp is known as a "Push To Test" lamp.

Trouble Localization

With even the largest machine, there should not be more than 10 points to check in any one step. For example, a machine may be large enough to warrant twenty sheets of schematic electrical diagrams. With the occurrence of trouble, nineteen sheets of those diagrams could be ignored. On the twentieth sheet, attention would be necessary to only one small portion that was indicated by the white light.

With the use of this system, the maintenance man does not have to know too many things about the machine before he comes to the scene of trouble. He does not care about the relationship of one sequence to another. He is merely interested in the one step where failure has occurred. Thus maintenance time is reduced with consequent productive time increase.

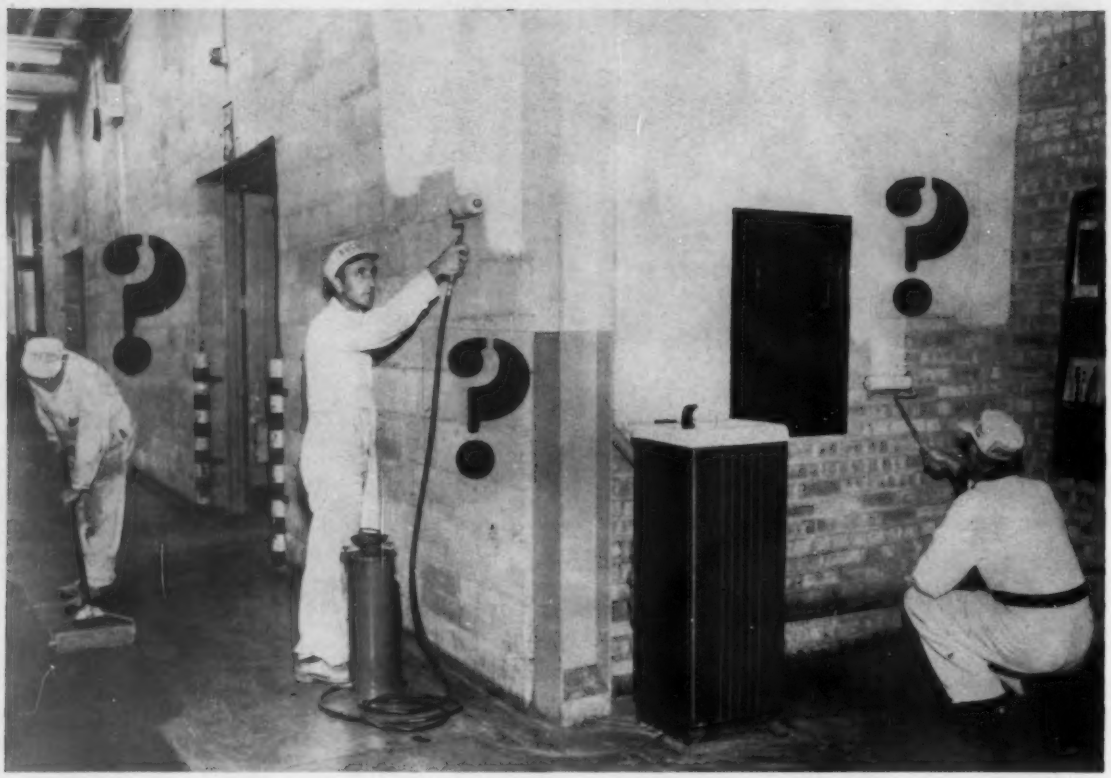


Fig. 1. Three types of surfaces—concrete block, brick and floor—might require different types of paint roller covers and, in this instance, three different rollers. Table on opposite page shows the best roller covers for use with different paints

What Paint Roller Cover Where?

It All Depends on Surface To Be Painted and Paint Used

INITIALLY PAINT rollers were developed for the home owner who did his own painting. Rollers were made before then, but they had not been practical enough to gain widespread acceptance. Lambswool was one of the early cover materials used and it worked well with oil base paints.

However, with the development of water and rubber-base paints, new cover materials were needed because the wool absorbed, roughly, 14 per cent moisture; then they became matted and would not apply an even coat of paint. Production of lambswool covers was a problem since skins coming from different climates varied considerably as to density and fineness of the wool.

New Materials

The paint roller industry was quick to develop cover materials that would be successful with the many new—and old—types of paints, and that would do a superior job of application. Today both synthetic and natural fibers are used in "blends" and "straights." Roller covers have been developed for specific paints and surfaces, and represent considerable research. Basically, a roller cover must have fibers of the proper denier and density to apply a particular type of paint evenly; have good paint holding characteristics, and not be affected by the chemical properties of the paint. This has led to the development of many roller fabrics, the applications of which are detailed following.

Somewhat later but paralleling the evolution of paint rollers for home uses came the development of rollers for industrial uses and applications. Generally, industrial rollers are sturdier in construction and larger in width and diameter, ranging in width from about 9 in. to 13½ in. Because of the many surfaces and paints that are used in industrial work, rollers and covers are offered in sizes and materials designed to do maximum quality work in minimum time. These rollers are for such varied duty as painting ships and large oil tanks to covering Cyclone and similar type wire fence.

Special rollers to apply liquids other than paints in production finishing are developed upon application to the paint roller manufacturer. Preservatives and adhesives have been applied using paint rollers, to cite a few special applications.

The techniques used in roller painting are simple and do not require any special skills. The dip type roller, which is most commonly used, is loaded in a special paint tray or a 5-gal bucket fitted with a bucket screen to remove excess paint. Then an "X" is drawn with the roller and the unpainted areas are filled in as in brushing. Parallel strokes are used. When painting floors, the paint may be poured on and then spread with the roller. Rollers with long handles are used. Forty-eight inch handles are also used to paint walls from floor to ceiling.

Speed of application is one of the factors that has caused the rapid acceptance of paint rollers in industrial work. As a

(Continued on page 90)

Table on opposite page shows recommended roller covers for use on various surfaces when using different types of interior and exterior paints. When more than one material is listed, bold face type is used to indicate one preferred

INTERIOR FINISHING

	ALKYD RESIN FLAT	LATEX RUBBER BASE FLAT	INTERIOR WALL PRIMER	FLAT OIL BASE	ENAMEL GLOSS — SEMI-GLOSS	ENAMEL FLAT OR SATIN FINISH	RUBBER BASE TEXTURE PAINTS	WATER BASE AND EMULSION TYPE	SHELLAC OR STAIN	HOUSE PAINT AND EXTERIOR TRIM ENAMELS	EXTERIOR RUBBER BASE PVA	ALL ALUMINUM PAINTS	WATER THINNED TEXTURE PAINT
SAND FINISH PLASTER AND DRY WALL	**Pronel** Lonel Mohair	**Pronel** Lonel Mohair	**Pronel** Lonel Mohair	**Pronel** Lonel Mohair	**Mohair** Pronel Lonel	**Pronel** Lonel Mohair	**Frieze** Carpet	**Pronel** Lonel					
PUTTY COAT OR SMOOTH PLASTER	**Pronel** Lonel Mohair	**Mohair** Pronel Lonel	**Pronel** Lonel Mohair	**Pronel** Lonel Mohair	**Mohair** Pronel Lonel	**Mohair** Pronel Lonel	**Frieze** Carpet	**Mohair** Pronel Lonel					
LIGHT SPANISH PLASTER	**Pronel** Lonel	**Pronel** Lonel	**Pronel** Lonel	**Pronel** Lonel	**Pronel** Lonel	**Pronel** Lonel		**Pronel** Lonel					
HEAVY SPANISH PLASTER	Long Nap Lonel	Long Nap Lonel	Long Nap Lonel	Long Nap Lonel	Long Nap Lonel	Long Nap Lonel		Long Nap Lonel					
ACOUSTICAL SURFACES								**Pronel** Lonel					
METAL				**Mohair** Pronel Lonel	**Dacron** Mohair	Mohair				**Dacron** Mohair		**Pronel** Lonel	
WOODWORK	**Mohair** Pronel Lonel			**Mohair** Pronel Lonel	**Mohair** Pronel Lonel	**Mohair** Pronel Lonel			**Mohair** Dacron			**Pronel** Lonel Dacron	
STIPPLING SURFACES	**Carpet** Frieze			**Carpet** Frieze			**Frieze** Carpet						**Sponge** Frieze

EXTERIOR FINISHING

	BONDING CEMENT PAINTS	EXTERIOR LATEX BASE	EXTERIOR PVA	HOUSE PAINT	HOUSE PAINT (OVER PRIMER)	STAIN	EXTERIOR TRIM ENAMELS	EXT. TRIM ENAMELS (OVER PRIMER)	EXTERIOR VARNISH	EXTERIOR RUBBER BASE	WATER PROOFING CLEARS	ALUMINUM PAINTS	
LIGHT STUCCO AND SMOOTH CONCRETE	**Pronel** Lonel	**Pronel** Lonel	**Pronel** Lonel		**Pronel** Lonel			**Pronel** Lonel			**Pronel** Lonel		
HEAVY STUCCO ROUGH MASONRY	Long Nap Lonel	Long Nap Lonel	Long Nap Lonel		Long Nap Lonel			Long Nap Lonel			Long Nap Lonel		
WOOD SIDING				**Dacron** Pronel		**Mohair** Dacron	**Dacron** Pronel		**Mohair** Dacron			**Pronel** Dacron	
BRICK	Long Nap Lonel	Long Nap Lonel	Long Nap Lonel		Long Nap Lonel			Long Nap Lonel			Long Nap Lonel		
ASBESTOS SIDING			**Pronel** Lonel		Dacron			**Dacron** Pronel		**Pronel** Lonel			

Fig. 2. Rollers can be used on structural steel work with finish work being done with conventional paint brush

rule-of-thumb, if the painter goes about one-half as fast as he thinks he should, the paint will be applied about twice as fast as by brushing.

If a surplus amount of paint is applied, the roller will pick up the excess and apply it to a dry surface. When the full coat has been applied, the roller will not pick up paint and spread it out too thinly. In other words, a roller can apply just so much paint and no more. The amount applied is the maximum if the proper roller cover is used. Over and above this, the roller will pick up the excess and apply it to a dry surface.

Hit Peaks, Miss Valleys

The reason for this is due to inherent characteristics of the roller fibers. These are short and extremely dense. A roller that is 1½ in. in diameter and 7-in. wide will have as many as 2,000,000 crimped fibers, which accounts for its paint-holding qualities plus the fact that it lays on an even, heavy coat. Because the fibers are short, and because of the "rolling" method of application, penetration of uneven surfaces is no problem. Where a brushing motion is used on a material such as brick or concrete, a light stroke will hit the peaks and miss the valleys, and a heavy stroke will load the valleys and clean the peaks.

Since paint rolling is fast, and since an even, heavy coat is applied, down time for maintenance is reduced to a minimum.

Types of rollers other than the dip type, which is most commonly used, are the fountain type and the pressure rollers. Fountain types are practical for applying wall paints or enamels. The cylinder of this type is loaded with paint which works out through the fibers as it is applied.

The pressure roller consists of a paint tank, a hose and a roller with a flow control valve. Pressure is pumped into the tank with a hand-operated, built-in pump. This method of application to large areas is claimed to reduce the painter's time by 20 per cent.

What Fabrics?

A listing of fabrics used for paint roller covers, and their recommended uses follows:

Pronel: This is a new material and a high quality product. Pronel is a dynel-type fabric fortified with nylon and is used with all paints—except acetones and derivatives such as ketone paints—on all smooth and semi-smooth surfaces. A definite advantage of this cover over less expensive dynels is that it does not break or "finger." When these defects occur, the paint is laid on in a mottled pattern and the surface must be gone over three or four times.

Lonel: This is another quality fabric that can be used with all paints—ketones, acetones, and similar paints excepted—and on smooth and semi-smooth surfaces. It has great density and provides a smooth, fine finish. The greater density of lonel makes it superior to less expensive fabrics.

Dynel: Dynel is inexpensive and can be used with most types of paints—again with acetones and ketones excepted—but it will not give the quality finish that either pronel or lonel will. Moreover, it is not recommended for applying enamels to smooth finishes because of a tendency to break and finger.

Raynel: An inexpensive fabric, raynel is a blend of rayon and dynel. It cannot be used with enamel or on a rough surface, and it cannot be used with acetones, ketones, etc. This is—more-or-less—a one-shot roller to be used and thrown away.

Note: All of the foregoing covers are blended with dynel—or are all-dynel. As stated, acetones, ketones, etc., are not to be used because they deteriorate dynel fibers. The same remarks hold true about

Fig. 3. Large concrete surfaces can be painted with considerable speed. Rollers fill in inequities in surface and do not remove paint from "hills" on the concrete

How to Clean a Paint Roller Cover

When using water-thinned paints simply rinse in lukewarm water several times and wipe dry with a cloth. After using oil-base paints clean with regular thinner. Then agitate, squeeze out excess liquid and repeat the operation until the cover is clean. Wipe dry with cloth. If desired, and for best results, take compressed air hose with nozzle attached as shown in photo. Hold nozzle at tangent to washed roller so that it will spin and throw water or solvent onto sides of drum. This results in a soft-textured roller.

solvents that contain these chemicals. Regular cleaning agents are used. See following.)

Mohair: Mohair is an inexpensive fabric, but it has proven to be successful in applying enamel and rubber base paints to smooth surfaces. It does not hold as much paint as the dynel covers because the nap is shorter. This is an advantage in applying enamel, though, because the paint flows out better, reducing orange peel to the minimum.

Carpet: The carpet cover is strictly for stippling and gives this effect when applying oil base paints.

Frieze: Also a stippling fabric, frieze is effective in applying textured paints over dry wall construction. The effect that frieze gives to the paint surface is one of semi-rough plaster.

Sponge: Another stippling cover. There is one difference, however. Sponge is not used to apply the paint to the surface, but rather, to give a textured effect after the paint has been applied. This cover is used with water-thinned texture paints only. Strong thinners or solvents must not be used as they will cause deterioration of the rubber.

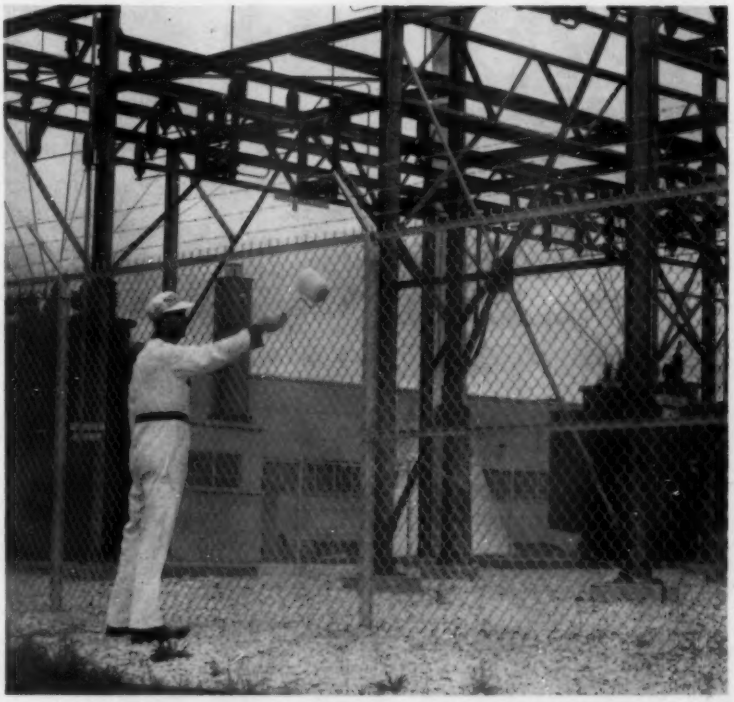
Lambswool: Lambswool is one of the early materials used for paint roller covers. When rubber base and water emulsion type paints came into the picture it became necessary to develop synthetic type fabrics. The reason for this is that lambswool contains lanolin, which absorbs water. When lambswool is used with rubber base and water emulsion paints, the cover will mat and become unusable. Lambswool is recommended for painting Cyclone-type and other wire fences. It is not recommended when acetone and ketone paints are used.

Dacron: Dacron is used only for the application of exterior paints on wood siding. The fibers are soft and flow the paint out to provide a smooth finish. Dacron is not to be used with interior paints and is not recommended for any other surfaces than wood siding. Do not use with acetone and ketone paints.

Woven Wool: This is a synthetic wool fabric and is used for the application of acetone, ketone, etc., paints. It does not give as smooth a finish as the quality dynel fabrics, but because it is not affected by the above chemicals, it is desirable for use with these paints.

The editors of PLANT ENGINEERING wish to give credit to E Z Paintr Corp., Milwaukee, Wis., for the information contained in this article. The photographs were taken at the plant of A. B. Dick Company, Niles, Ill.

Fig. 4. Lambswool roller covers are used for painting wire fences of all types but this material must not be used with acetone or ketone paints on any surface



Instrumentation Planning Procedures

Diagrams, Equipment, Controls for Process Work

By **CHESTER S. BEARD**, Research and Development Engineer, Foster Engineering Co.

"TAKE A BOTTLE of whiskey from the stock if you can get along without an instrument, but donate a bottle if you install an instrument unnecessarily." This is what one very good process department head, who was a firm believer in instrumentation, had to say. Instrumentation of a plant or a system should be studied with the objective of measuring or controlling any stream and any variable which, if eliminated, would cause loss of production or jeopardy of product quality. The instrument engineer knows that it is not too easy to get one of those bottles of whiskey and still satisfy the above stated requirement.

Before considering meters, panel boards and valves, we shall consider a few general questions which affect the approach to the job. The problem is quite different when instrumenting a new plant than it is to add necessary equipment to an existing plant.

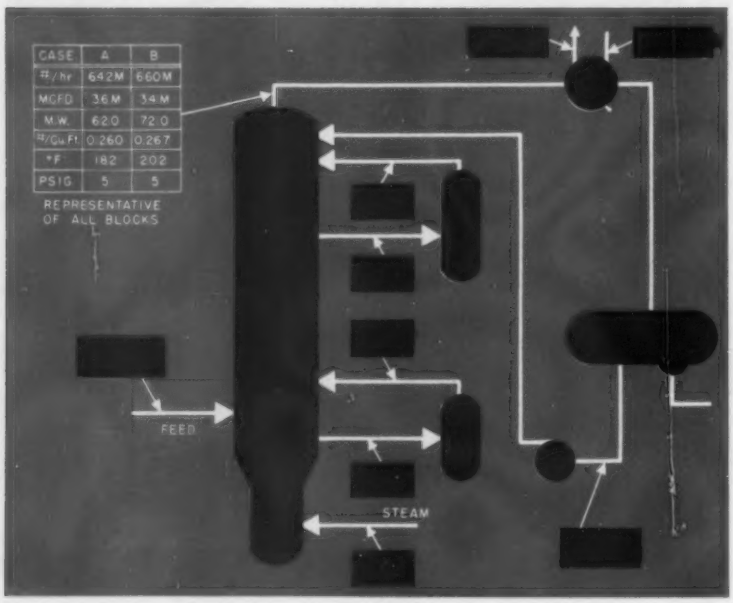
It is much easier to take a well laid out piping diagram and process flow sheet and determine that this temperature and that level must be controlled, than it is to integrate new equipment into an existing plant. It is also considerably easier to throw in unnecessary instruments on newly developed flow sheets than to put them into the old plant.

Modernizing the old plant is easier in one respect: namely, operating difficulties and past experience offer guidance in the project. Revision of the instrumentation of the existing plant, whether it be to add the necessary measurement and control, or whether it be to obtain centralized control, requires imagination and field experience in locating valves, meter runs, and other necessities at points which will accomplish the desired end with a minimum of pipe fitting and instrument piping.

How much is it going to cost? This question seems to arise even before a summary of the job has been made. There seem to be no set percentages to apply to the total cost of the plant to obtain instrument cost. It is only evident that the portion to be spent for instruments is continually rising due to recognition of their value. Percentages of expenditures which will cover complete automation will vary with the installation.

One of the lowest proportions occurs in instrumenting a pipeline. Telemetering sequence control of pumps, measurement, emergency systems, and all the trimmings are insignificant in relation to the tremendous cost of the pipeline itself. On the other hand, the expense of central graphic control and emergency operation of a small chlorine dioxide unit, for instance, will be a major part of the total expenditure.

Fig. 1. First, create a picture of your problem. The first step is the "process flow diagram" showing major pieces of equipment. No effort should be made to place the part physically in the production plant or processing set-up



Process Flow Diagram

Two questions arise simultaneously. How much measuring and controlling should be done, and should instruments or control systems be employed? Before answering these questions, we shall discuss the tools at our disposal to create a picture of the problem. The first tool is a "process flow diagram," Fig. 1. This shows major pieces of equipment such as fractionators, heat exchangers, pumps, direct fired heaters, just to name a few. On this flow sheet, no effort is made to place the equipment geographically.

Every effort is made to show the progress of "feed" through the process in a clear manner that is easy to follow. All product lines are shown. Major cooling water, steam and fuel flows only appear at the equipment using the utility. Very few hand or control valves or meters are shown unless they create a change of state or are used for an alternate operation.

The diagram shows the method as applied to a fractionating column. No effort has been made to make the example complete or a correct representation of any particular process. Each block will contain the conditions expected to exist in the line designated, while operating under as many cases as are set up by the process engineer. The block may include some or all of the following: volumetric and/or gravimetric flow rate, gravity, viscosity, temperature, pressure, heat rate, and any physical characteristic peculiar to the process.

Complementary to this process flow

(Continued on page 94)

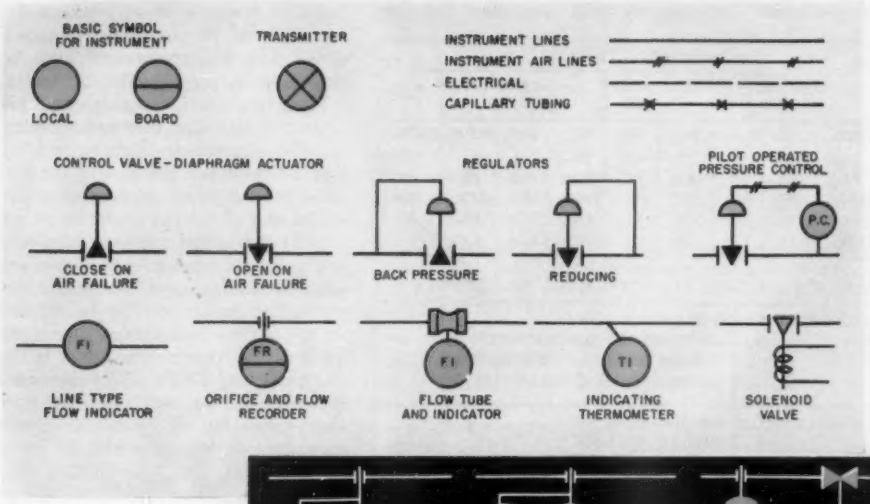


Fig. 2. Symbols for various components in any instrument or control system as developed by the ISA

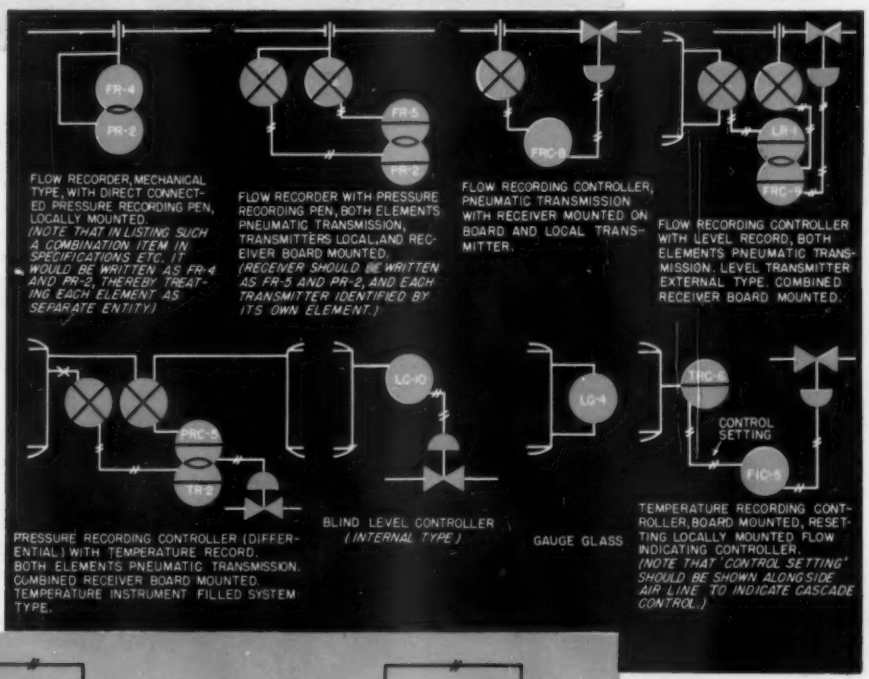

FR-4
PR-2
FLOW RECORDER, MECHANICAL TYPE, WITH DIRECT CONNECTED PRESSURE RECORDING PEN, LOCALLY MOUNTED. (NOTE THAT IN LISTING SUCH A COMBINATION ITEM IN SPECIFICATIONS ETC. IT WOULD BE WRITTEN AS FR-4 AND PR-2, THEREBY TREATING EACH ELEMENT AS SEPARATE ENTITY)
FR-5
PR-2
FLOW RECORDER WITH PRESSURE RECORDING PEN, BOTH ELEMENTS PNEUMATIC TRANSMISSION, TRANSMITTERS LOCAL, AND RECEIVER BOARD MOUNTED. (RECEIVER SHOULD BE WRITTEN AS FR-5 AND PR-2, AND EACH TRANSMITTER IDENTIFIED BY ITS OWN ELEMENT.)
FRC-6
FLOW RECORDING CONTROLLER, PNEUMATIC TRANSMISSION WITH RECEIVER MOUNTED ON BOARD AND LOCAL TRANSMITTER.
LR-1
FRC-9
FLOW RECORDING CONTROLLER WITH LEVEL RECORD, BOTH ELEMENTS PNEUMATIC TRANSMISSION. LEVEL TRANSMITTER EXTERNAL TYPE. COMBINED RECEIVER BOARD MOUNTED.
PRC-5
TR-2
PRESSURE RECORDING CONTROLLER (DIFFERENTIAL) WITH TEMPERATURE RECORD. BOTH ELEMENTS PNEUMATIC TRANSMISSION. COMBINED RECEIVER BOARD MOUNTED. TEMPERATURE INSTRUMENT FILLED SYSTEM TYPE.
LC-10
BLIND LEVEL CONTROLLER (INTERNAL TYPE)
LG-4
GAUGE GLASS
TRC-8
CONTROL SETTING
FIC-5
TEMPERATURE RECORDING CONTROLLER, BOARD MOUNTED, RESETTING LOCALLY MOUNTED FLOW INDICATING CONTROLLER. (NOTE THAT 'CONTROL SETTING' SHOULD BE SHOWN ALONGSIDE AIR LINE TO INDICATE CASCADE CONTROL.)

Fig. 3. Combinations of the symbols shown in Fig. 2 above, can be employed to depict practically any control system. A few are shown here

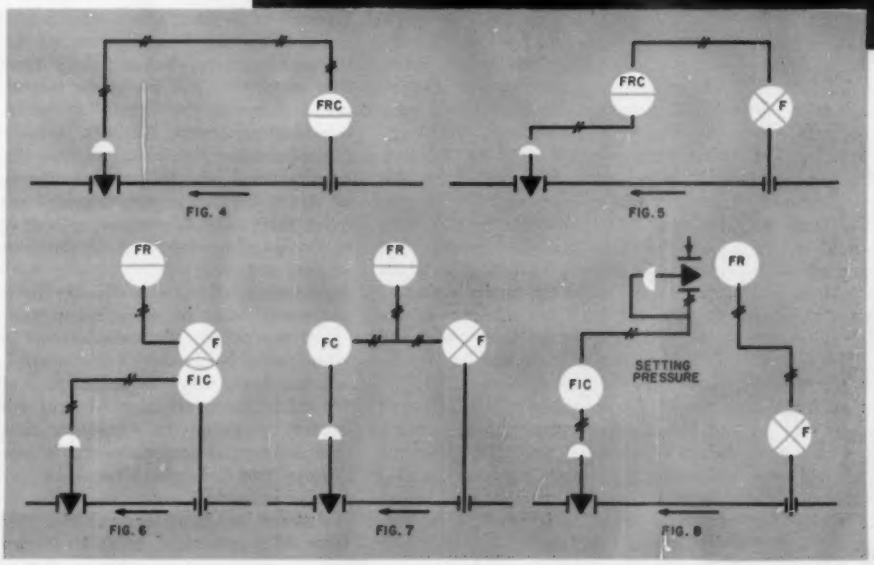


Fig. 4 through Fig. 8. Various types of controller systems as they may be depicted using the above symbols. Functions of these systems are explained fully in text

Table I. Instrument designations and abbreviations based upon their functions

MEASURED VARIABLE	INSTRUMENT FUNCTION								
	CONTROL DEVICES			MEASURING DEVICES		ALARM DEVICES			TEST
	REC.	IND.	BLIND	REC.	IND.	REC.	IND.	BLIND	POINTS
TEMPERATURE	TRC	TIC	TC	TR	TI	TRA	TIA	TA	XT
PRESSURE	PRC	PIC	PC	PR	PI	PRA	PIA	PA	XP
DIFFERENTIAL PRESSURE	DPRC	DPIC	DPC	DPR	DPI	DPRA	DPIA	DPA	XDP
FLOW	FRC	FIC	FC	FR	FI	FRA	FIA	FA	XF
LEVEL	LRC	LIC	LC	LR	LI	LRA	LIA	LA	

PREFIX ALL CONTROL VALVES WITH LETTER V THUS:- VFRC
HIGH OR LOW ALARM DEVICES TO BE PREFIXED BY LETTERS H OR L RESPECTIVELY

ADDITIONAL MEASURED VARIABLES			
SPECIFIC GRAVITY-DENSITY	D	HYDROGEN ION CONCENTRATION	pH
SMOKE DENSITY	SD	CARBON DIOXIDE CONCENTRATION	CO_2
OPERATION	O	OXYGEN CONCENTRATION	O_2

MISCELLANEOUS ABBREVIATIONS			
THERMOCOUPLE	T	VACUUM BREAKER	VB
RESTRICTING ORIFICE	RO	RELIEF VALVE	RV
MANOMETER	M	BURSTING DISC	BD
GAUGE GLASS	GG	MANUAL SET	MS
DISPLACEMENT METER	DM	RATIO RECORDING CONTROLLER	R-RC
SOLENOID VALVE	SV		

sheet is the "piping and instrument diagram." This diagram should give a complete picture of the plant. Of necessity, full coverage of a plant such as a refinery, or paper mill, will require dividing the plant into sections.

On the piping and instrument diagram, all equipment, hand valves, control valves, instruments and lines must be shown. There is one exception. Instrument lines are not shown. Instruments are shown by using symbols. Each line, valve, and meter run is identified and sizes are noted.

Designations and Symbols

Complete standardization of symbols or outlines of all instruments and equipment will be very helpful in decreasing misunderstandings. As shown in Figures 2 and 3, and in Table I, a standard set of instrument designations and symbols has been developed by a committee of the Instrument Society of America. Letters of identification, Table I, are used to designate the process variable, and functions of the instrument.

Additional designations of process variables, such as pH or CO_2, may be added. The same letter should not be used for more than one designation in the same position in the combinations. To identify a control valve, a V is placed before the letters. Many numbering systems are used. The instrument numbers of a new plant will most likely become a series for the plant.

Numbers for an additional unit or a revision may be integrated with the existing system. Many instrument departments use a separate series for each variety of instrument.

These letter designations are used in conjunction with a group of symbols when they appear on a piping and instrument diagram (P and I.D.) in Fig. 2. This eliminates having to make a picture of the valve, orifice fitting, transmitter or conductivity cell each time it appears on the diagram. Combinations of these symbols can depict practically any control system. A few of these are shown in Fig. 3. Granted, this is super-simplification of complications which must be overcome finally to install the instruments, but for the P and I.D., the simpler the graphic representation can be, the better tool the P. and I.D. becomes.

With a process flow sheet and an embryonic P and I.D.—that is, one without instrumentation—a start may be made to answer the two questions which have been posed. A good method is to install, by symbol only, measurement facilities for all flows, temperatures, pressures, etc. which would have any possible bearing upon the process. From these, the desirable measurements may be selected.

This selection is based upon the need for measurements to (1) account for raw materials entering the plant and finished products leaving the plant; (2) make a heat balance, product balance or other analysis that is required to check the efficiency of the plant; (3) actuate the controllers; and (4) identify unsafe operating conditions caused by process reactions.

Need for continuous measurement of incoming raw materials assumes a plant which must process at the rate of supply as in a casing head gasoline plant, rather than a paper mill where the raw material is used on a predetermined schedule.

Major products or by-products delivered from the plant must be measured. The instrumentation may be flow meters, gaged tanks, or scales.

Many engineers recognize and bemoan the fact that they are working for the accounting department, but they all recognize the cost of the finished product must compare equitably to the cost of the raw material.

Most instrument engineers who have had practical experience in plants are wary of eliminating any primary element that could possibly be wanted by a process engineering department for analytical work. Too often is the statement made, "We won't ever need that temperature," or "just give us a short meter run; if we use it we will only want an approximation."

Test Points

It is economical to be lavish with test points with a valve installed for a pressure gage, or a thermometer well in the line to accommodate a temperature instrument at some future time. Installation of these test points does not indicate the use of a recorder or controller which runs continuously.

What can be measured can be controlled. That is a common axiom. A relative statement is that a variable must be measured to be controlled. Thus, provisions must be engineered for measurement of these variables. If the feed to a fractionating column is to be held constant, the flow must be measured so that it can be controlled. This presents the problem of determining the variables that must be controlled so that provisions may be made for their measurement.

Fourth necessity for measurement is to recognize unsafe conditions. Upon recognition of these conditions, an alarm or an overriding control can forestall occurrence of an emergency.

Selection of the variables to be measured or controlled to satisfy these four conditions will bring the instruments shown in the P and I.D. to an equitable minimum. In fact, resolution of the question as to whether the consideration should be instruments or control systems may readily require more than this minimum instrumentation. In some cases the decision is clear cut.

Instrumentation of a digester in a paper mill must be a control system. Upon acceptance of three-element or two-element boiler feed water control, a control system is mandatory. On the other hand, selection of pressure control equipment for a meter station and differential control to cut in additional meter runs both require selection of individual instruments.

Automation is at present the epitome of a system of control. It can

be applied to many processes and should be considered seriously. On the other hand, there are innumerable plants to be designed or those requiring modernization, in which a nominal amount of measurement, control, and alarm equipment will obtain maximum output of highest quality product. There are still many plants in which the addition of a few strategically placed instruments will allow an operator to get the most out of his plant. In these plants, new or old, the use of digital read-out systems and intricate cascading is unnecessary.

This should in no way be taken as denunciation of the so-called automatic plant. There is an economic point which must be determined between the use of a log sheet, recording instruments, and the systems which will collect and print a great number of variables.

There are more and more processes being developed in which the number of variables is so numerous that it is vital that an unacceptable deviation from a controller set point must be indicated immediately rather than waiting for the operator to notice the change. If this is the case, consider using equipment that will do this as well as adapt itself to the future use of a computer which can evaluate the deviation and initiate a correction.

Controller Systems

In the past, it was easy to set up a controller. The static lines, capillary tubing, or thermocouple wire was brought to the pneumatic recorder controller and a copper tubing line was run to the control valve as is depicted in Fig. 4. Certain length limitations were placed on these connecting lines so any control board had to be at a point within the required distance from each primary element and control valve. These parameters have disappeared and other approaches must be considered.

Pneumatic transmission has contributed at least three methods of control. By pneumatic transmission almost any variable from pressure to speed may be converted to a linear pneumatic pressure output. This output may be received by a pressure element with a range so that a recorder indicator may be calibrated to show the value of the variable. This transmitted impulse may be taken to a controller on a board (Fig. 5) and the output of the controller fed to the control valve.

In another system, (Fig. 6), the controller containing a transmitting element can be installed locally. In this case, the output of the controller goes to the control valve which in all probability is near at hand while the transmitted signal may be taken to a board-mounted instrument for observation by the operator.

A transmitted impulse may be taken to a receiver bellows in a controller which is integrally mounted on the valve, (Fig. 7). At the same time another impulse line goes to a board mounted recorder.

Addition of a pilot regulator on the board (Fig. 8) makes it possible to change the set point of a locally mounted controller. This makes it possible to take advantage of the systems with the shortest transmission lags, at the same time giving the operator the ability to change the setting of the controllers.

All of the systems outlined have been pneumatic. Although certain industries have been putting electric control systems to work for a longer time than the pneumatic system has existed, the pneumatic system predominates in the refinery and process field.

Quite recent developments in the electronic field make this method worthy of consideration. Electrical methods still have drawbacks in plants processing flammables. Most electronic systems use a transmitter which measures the variable and translates this to an electrical impulse. This impulse motivates a recorder and a control circuit. The output of the control circuit may position an electric actuator on the control valve; or may operate a relay which controls the air pressure to a pneumatic actuator.

Selection of an electronic system must be based on a complete analysis of the requirements of the plant weighed against an estimated price comparison between pneumatic and electrical methods.

Panel Boards

Way back when, there appeared a very logical trend toward grouping meters, gages, and controllers at one point. Now it is not a question of merely grouping, but also how to group. Any grouping is called centralized control.

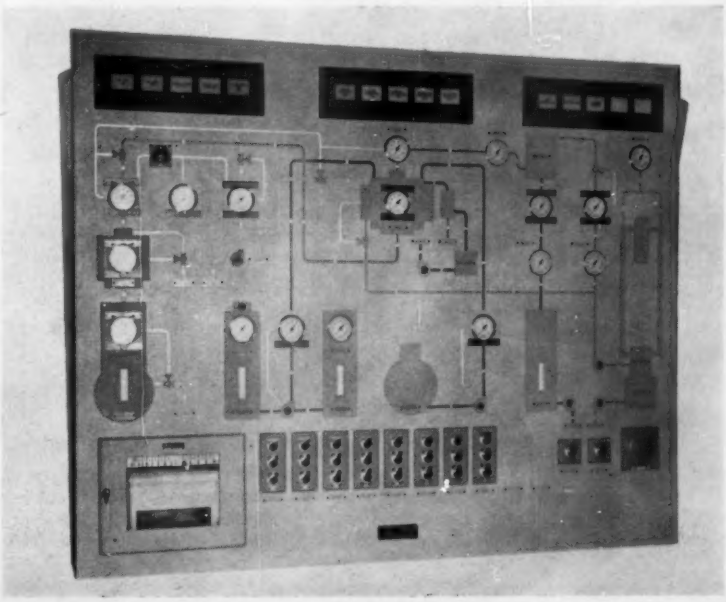
Simplest approach to centralized control is to put all standard 12 in. chart recorders and controllers on one board with an effort to position each instrument in some logical relationship to the other instruments. Many processes adapt themselves to this line-up. The main difficulty lies in the evolution of boards which require operators to travel on roller skates.

Use of miniature recorders or indicators can reduce this centralized board to about 20 to 25 per cent of the size required by the large recorders. Use of these small instruments is furthered by taking advantage of the control systems shown in Figures 5, 6, 7 and 8.

Use of transmission systems increases the versatility of any of these approaches. An intermediate step between large and miniature instruments is to install the standard sized recording controllers on a sub board

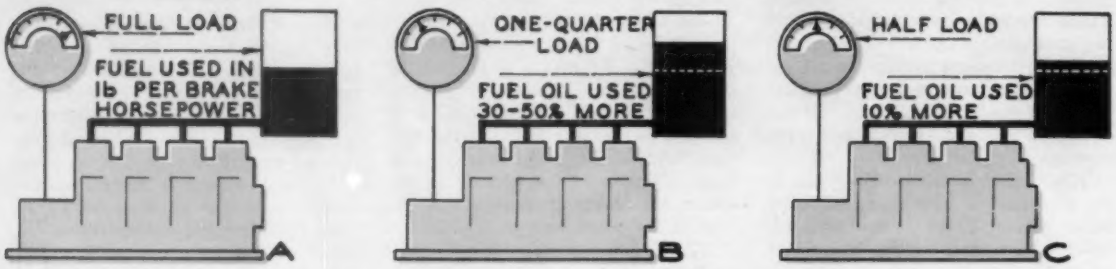
(Continued on page 198)

Fig. 9. Graphic boards such as this one are designed to give complete picture of process. These employ miniature instruments located in the diagram at a point corresponding to the point in the process at which the measurement is obtained



Loading Effects on Diesel Engines

Underloading

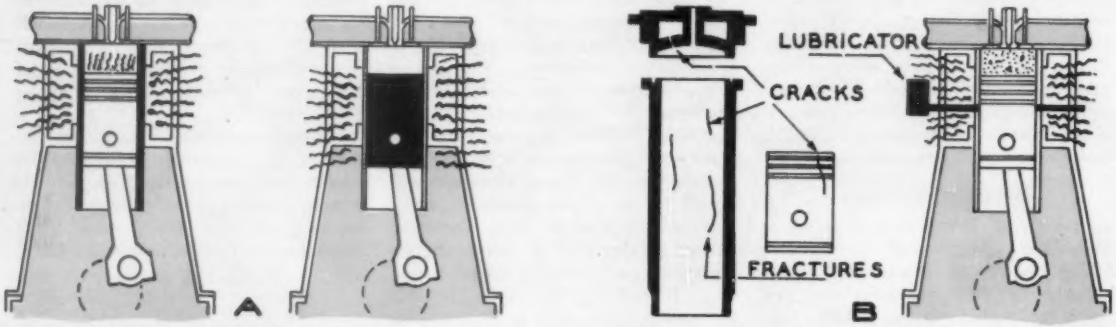


Diesel engine is usually built for a certain brake horsepower or load. It does best all-around work operating at full load or not less than two-thirds.

One-quarter load: Fuel used in lb per brake-horsepower hour is more than at full load. In some cases it's 30 to 50 per cent more than at full load.

Half load: Fuel used in lb per brake-hp-hr is only little more than full-load consumption. In most cases 10 per cent more than at full load.

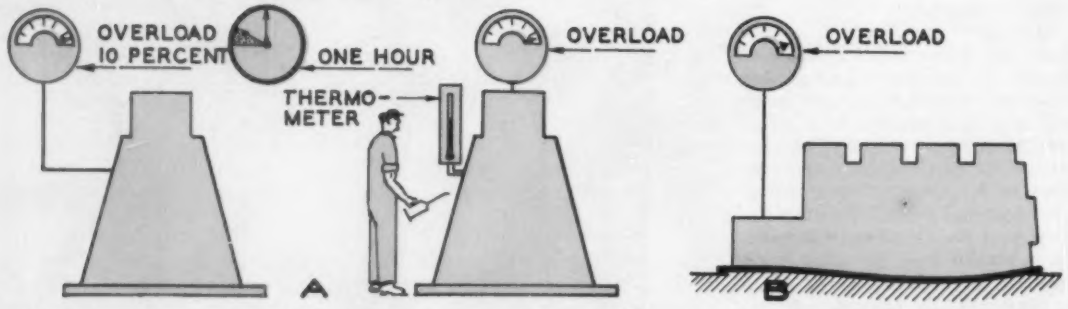
Overloading



Cylinder walls and pistons become gradually overheated as engine runs overloaded. That means serious wear and tear on various engine parts, with possible early engine failure. Watch lubricators if engine is over-loaded.

Cylinder liners, working overloaded, are subject to fractures and even cracks. Some cylinder heads crack under overload when head bolts are excessively tightened. Cylinder lubrication fails. This will cause early trouble.

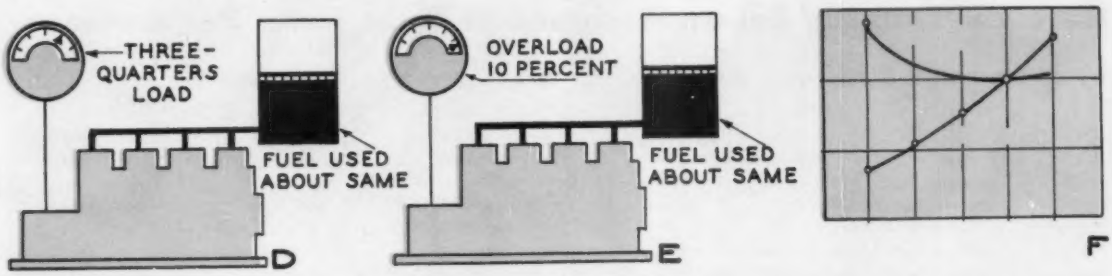
Overload Effects and Remedies



Total time engine is overloaded can usually be controlled. Keep down to one hour and not over 10 per cent overloaded. During this time continue to check engine carefully. Pay especially close attention to the engine temperatures and to lubrication. An underloaded engine's only fault is high fuel consumption for the work done. Engine will run cool.

Foundation settling causes slight misalignment with time. It's exaggerated here, but overloaded engine heats up from this condition, causing more wear.

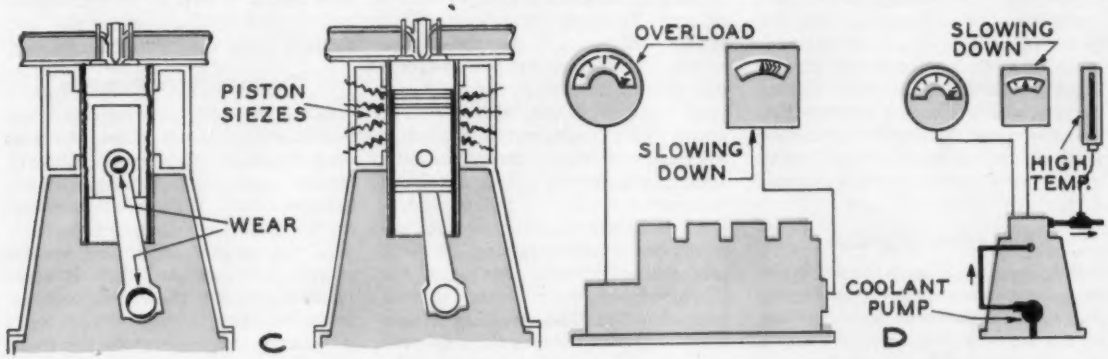
By RALPH R. TAGGS, Special Engineering Correspondent



Three-quarter load: Fuel used in lb per brake-hp-hr is about the same as full-load consumption. In most cases difference is small enough to ignore.

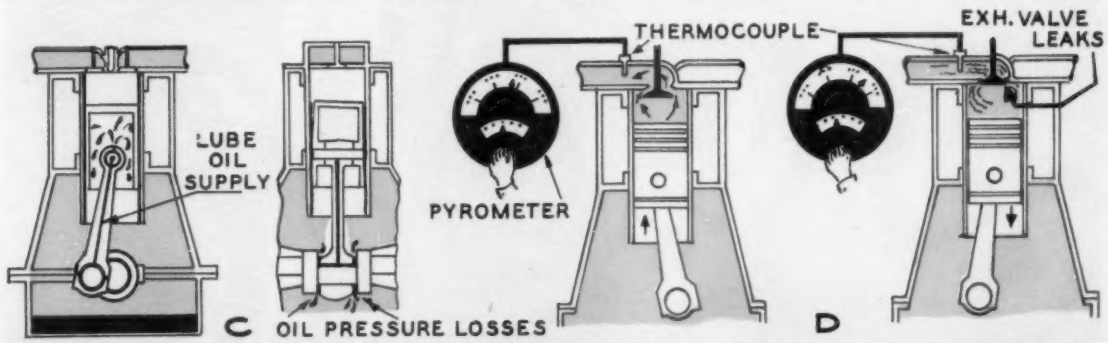
At 10 per cent overload, fuel used in lb per brake-hp-hr is little more than at full-load, about same as at three-quarters load. But engine wears fast.

Total fuel used at various loads increases gradually with the load. But fuel used in lb per brake-hp-hr goes down as load on engine increases.



Excessive friction and wear between pistons and cylinders in overloaded engine is certain if overload continues for long. This causes rings to stick and pistons seize. To avoid, balance load with standby engine at peak load periods.

Reduction in speed often occurs when engine is badly overloaded. If water-circulating pump is attached directly to engine shaft, cooling is reduced just when it is needed most. The engine temperature shoots up, creating trouble.



Lube-oil systems become less efficient with time and poor maintenance. Out-of-line engines have lower lube-oil pressures. Overloading knocks out engine.

Unequally loaded cylinders are found by checking exhaust temperatures from each cylinder with pyrometer. Highest temperature indicates cylinder carrying most load. Adjust fuel so temperatures are within 10 F. High exhaust temperature is sometimes caused by leaky exhaust valve. Over- and underloading causes black smoke.

Refinery Fires Are Bad Actors—
Here's a Training Set-up Designed to Ruin Their Performance

BY J. A. MOWRY, Safety Dept. Manager, Socony Mobil Oil Co., Inc., E. St. Louis, Ill.

FOR SEVERAL YEARS the East St. Louis Refinery of the Socony Mobil Oil Company, Inc., has had in effect an extensive fire control training program. This program was developed because of the desire of top management and the safety department to provide adequate trained personnel to combat the ever present potential fire hazard in the refinery.

This program was designed to give fire control training, on a continuous basis, to approximately eighty-six employees out of an average total of 600 employees. The employees are selected in a manner that assures the presence of at least nine trained men on the evening and midnight shifts. During the day shifts, Monday through Friday, there are thirty-six trained men available and on Saturday and Sunday on the day shift, fifteen men are available.

Fire Crew Selection

Employees serving on the fire crews are selected in two ways: operating and maintenance shift personnel are on the fire crew because of the nature of their responsibilities; maintenance employees working Monday through Friday on the day shift are selected by the foreman of the department. The safety department informs the foreman of the exact number of men who must come from each department. This is done so that the fire crews have mechanics from each maintenance department. At the same time it prevents any one department from providing above its quota of employees to keep the fire crews at full strength.

The frequency and duration of the training sessions are varied because of the round-the-clock working of the refinery. Thirty-six maintenance employees receive 1½ hr training a month. Approximately 40 operating and maintenance shift personnel receive one hour of training every three weeks. Two maintenance employees working odd shifts throughout the week are given eight hours training each year.

All management personnel have received fire control training. In 1952 two separate courses were given, one of eight hours and the other of four hours duration. These training courses will be repeated to bring the employees up-to-date on new fire control methods as well as to familiarize them with new equipment that has been purchased. Three men in the safety department are qualified to conduct fire control training sessions. However, one man is designated to do the major part of this training.

During the sessions at the fire training grounds, all fire crew members receive actual experience in handling fire equipment. Fires are started and the crew members extinguish them in the manner they deem best. Constant repetition in the handling of equipment serves to keep the crew members thoroughly familiar with the fire fighting units and items at hand.

Training Arrangements

When the weather is inclement and the training sessions cannot be held outdoors, the fire crews meet in a conference room. Instruction films on fire extinguishing are shown. Discussions are carried on in reference to refinery fires that might occur and present serious problems. An effort is made to determine how these fires could be controlled.

Training equipment at the fire training grounds include: 1. split drums; 2. tanks ranging in size from four to

Fig. 1. Practice-raising of foam tower

Fig. 2. Oil fire after tower-foam use

Fig. 3. Foam applied with hose nozzle

Fig. 4. Extinguishing oil fire in a large pit with dry powder

Fig. 5. Men are getting ready to use dry powder on flange fire

twenty feet in diameter; 3. a pit, ten feet in diameter, two feet deep; 4. a pit, twenty by thirty feet, one foot and a half deep; 5. a trench, fifteen feet long by one foot wide, fifteen inches deep equipped with removable steel cover plates; 6. an electric pump drawing from a header connected to four, fifty-five gallon drums which contain gasoline, kerosene, and No. 2 fuel oil; 7. piping for demonstrating LP gas fires.

Products flow to: 1. a four-inch overhead pipe eight feet long with a flanged joint at the middle and mounted on steel supports approximately eight feet from the ground; 2. a fire control training pump mounted on a slab; 3. a sheet metal building approximately eight by ten feet; 4. a perforated pan mounted at the top of a steel stairway twelve feet from the ground; 5. a miniature tank car complete with dome and drain line, mounted on steel supports four feet from the ground; 8. three-compartment tank truck, each compartment equipped with pressure relief valves.

Program Results

Since this program has been in effect, the manner in which fires have been controlled has improved immeasurably. Better coordination between the crew members themselves as well as the safety department and the crew members has resulted. Through this training the fire crew members have come to respect fires rather than fear them and as a result do a far better job in combating them.

In two specific instances we feel that the fire control training program justified its existence. These occasions had to do with fires on floating roof tanks, one containing gasoline and one containing crude oil. Both were controlled in a minimum amount of time and with little confusion. These fires occurred on the evening shift and on the midnight shift when a minimum number of trained employees were on duty. No call was made for additional help and it was not until the following morning that the safety department knew that the fires had occurred.

Our fire fighting control program has become as much a part of the refinery operations as the refining of crude oil. It will continue as described above until such time that it will be expanded, but the thought of not having it is never considered.

Fig. 6. Dry powder being applied to a gasoline tank truck fire

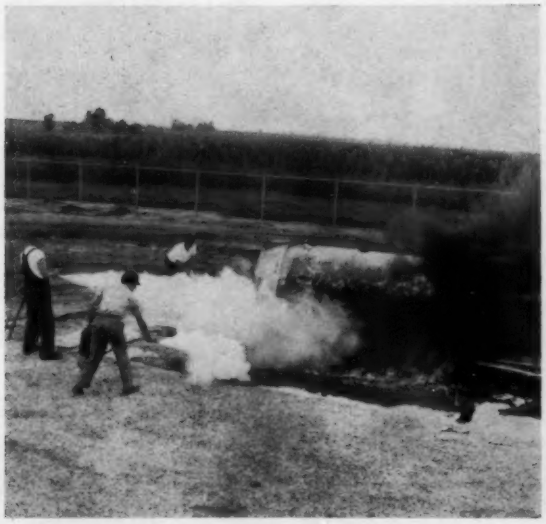
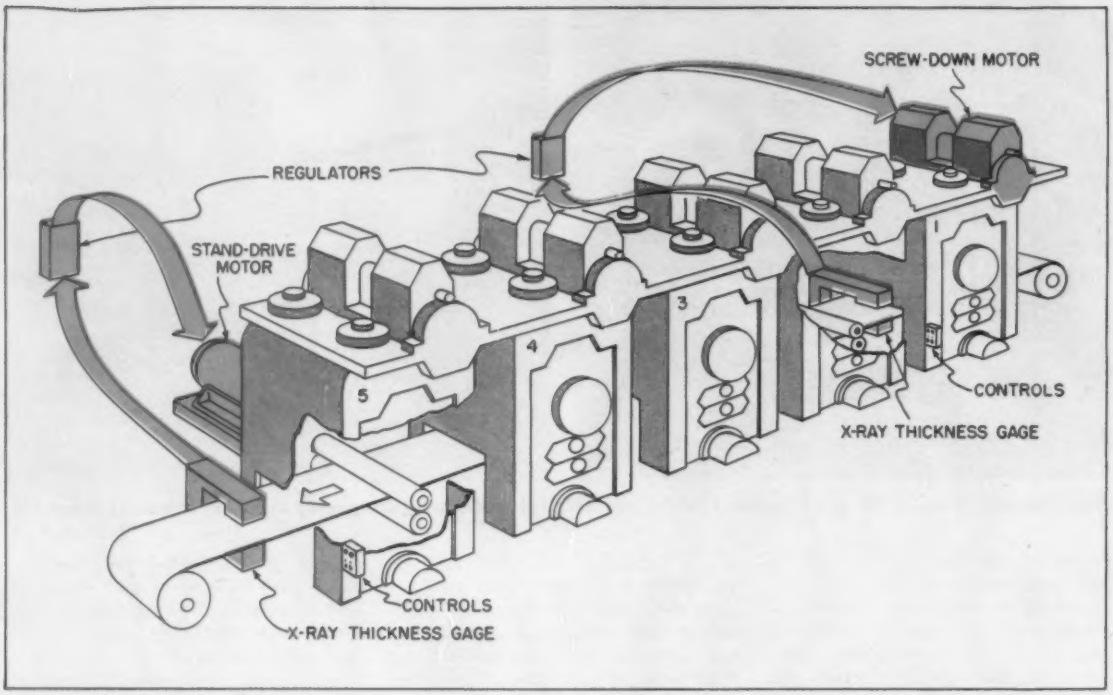


Fig. 7. Oil flames get a treatment with water from a fog nozzle



X-ray gages between the first and second stand and after the fifth stand are connected to two regulating systems which maintain strip thickness by controlling operation of screw-down motors on first stand and drive motor of fifth stand

X-Ray Gages and Regulating Systems Team-Up—Result:

Electronic Control of Steel Strip Thickness

CLOSER, CONTINUOUS control of cold reduction mills producing sheet and strip products is possible with the recent installation of an x-ray gage system on a five-stand tandem cold reduction mill at U. S. Steel's Irvin Works at Dravosburg, near Pittsburgh, Pennsylvania. This system was developed through the cooperative efforts of the United States Steel Corp. and the General Electric Co.

This installation is the first overall thickness control unit in the steel industry to utilize not only a screw-down control to vary reduction on the first stand, but also a vernier system operating on the roll speed of the last stand. With this arrangement, thickness variations in the finished product can be held smaller than was ever possible by manual means.

One unique feature of the regulating system is that it is completely free of vacuum tubes and was designed on the basis of transistor and magnetic-amplifier techniques and components.

The automatic gage control system consists of two portions. A coarse system utilizes an x-ray gage between the first and second stand and a regulating system to operate the screwdown motors on the first stand. A vernier system utilizes the x-ray gage after the fifth stand and a regulating system to vary the stand drive motor speed of the fifth stand so that the proper thickness is maintained.

In the coarse system an x-ray gage is mounted between the first and second stand to measure strip thickness out of stand No. 1. The x-ray gage is built in such a way that the desired thickness is set on the x-ray gage as a reference signal.

How Adjustments Are Made

Difference between actual thickness and desired thickness is transmitted as a deviation or error signal. This signal is fed into a transistor amplifier system which determines the direction of error, that is, whether it is heavy or light. This polarized signal is then fed into the amplistat automatic control system.

The automatic control system is designed so that if the strip coming out of stand No. 1 is one-half mil off gage, the screwdown motors will run for a shorter time than if the strip were 1 mil off gage. This type of operation requires the screwdown motors to jog less frequently to bring the thickness back into tolerance than if the timed pulses or "on" times were always equal.

The coarse gage regulating system is designed to reduce large thickness variations to small thickness variations. These small thickness variations are further reduced by the operation of the vernier regulator on stand No. 5.

The mill motor on stand No. 5 receives its power from a common source which also supplies power to the other stands of the drive. The motor field has a current regulator consisting of an exciter and an amplidyne with both coarse and vernier rheostats controlling the excitation. With the regulator, speed of the fifth stand can be controlled in relation to previous stand motor speeds and thus adjust the thickness of the material leaving stand No. 5 by varying the tension between the fourth and fifth stand.

Motor-Cleaning Time Cut to Minutes

Rock Island Road's Special Room Improves Quality, Too

TRACTION MOTORS and generators of all sizes are cleaned, reconditioned and rewound at the main shops of the Chicago, Rock Island and Pacific Railroad, Silvis, Ill. The electrical department in which this work is done is one of the largest of its kind in the country.

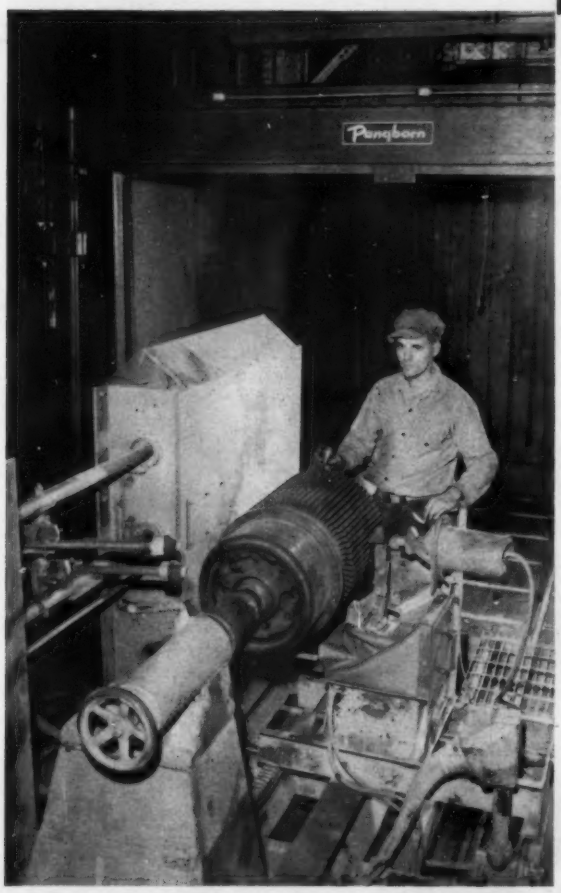


Fig. 1. The two nozzles at left blow sand at different angles as carriage moves back and forth and indexes at each pass

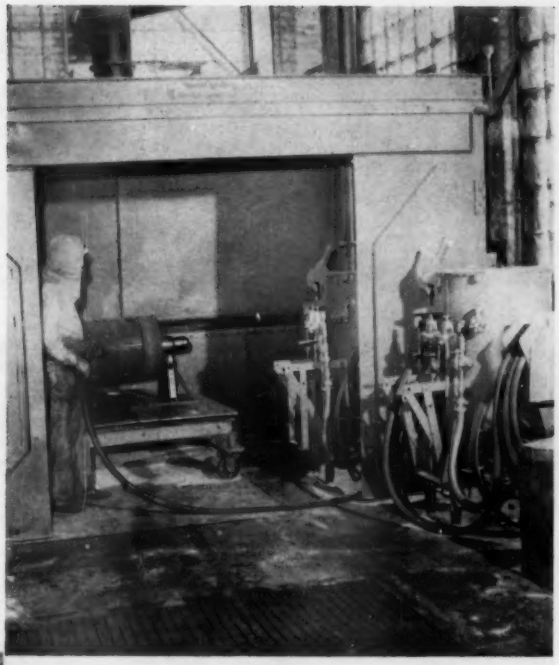


Fig. 2. Motors with wiring and soft components are cleaned by means of sawdust or corncob grits in another room. The two tank units visible at the right contain the grits

Cleaning is the first step in preparing a used motor for additional service on the road. In the case of large traction motors requiring a rewind, the armature is stripped down to the bare metal and cleaned in a special airblast room made by the Pangborn Corporation of Hagerstown, Maryland.

The armature is placed on a wheeled carriage on which it is pushed in and out of the room. Blast cleaning is done automatically with white silica sand blown from two fixed nozzles at two different angles. The carriage travels back and forth, Fig. 1, as the blast cleans one slot at a time.

A simple indexing device automatically rotates the armature one slot at the end of each trip. Armature cores are now cleaned by airblast in 20 minutes compared with six to seven hours labor by the wire brush method used previously. The quality of cleaning is also better and can be relied upon to be consistent.

Softer Grits are Also Used

For electrical motors and generators which are not stripped of wiring and other soft components, the Rock Island uses sawdust or corn cob grits in a separate room shown in Fig. 2. Two tank units, using compressed air from the plant system, dispense either sawdust or corn cob grits depending on the parts to be cleaned. Where wiring or soft materials are exposed to the blast, the softer corn cob grit is used. Mud, grease and loose varnish are removed without damage to the wiring. For cleaning the outside of motor frames, the harder sawdust removes grease, dirt and loose paint at a fast rate without damage.

The airblast method has replaced wire brush cleaning with a time difference of five minutes for airblast versus 30 to 45 minutes with wire brushing. It has also eliminated a lot of aching backs.

How Martin Uses Compressed Air to

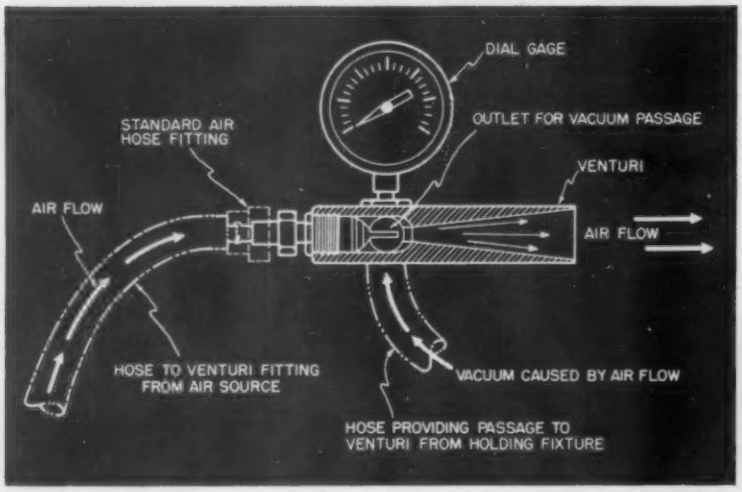


Fig. 1. This schematic diagram shows how the venturi looks inside and also shows how it works. Compressed air, from the shop supply, flows into the venturi through the air hose at the left. As it passes the side opening a vacuum is created

Fig. 2. A hose from the shop compressed air supply is quickly connected to the venturi fitting which is located within easy reach of the machine operator. There is little delay in applying vacuum because of the quick disconnect fitting

THIS NEWLY DEVELOPED venturi fitting, conceived at the Baltimore plant of Glenn L. Martin, replaces a vacuum pump at one-tenth the cost. When used on vacuum holding fixtures, parts are loaded and unloaded from the machine tool quickly and easily.

This fitting is about 80 per cent efficient in converting air power to vacuum power, and the schematic drawing shows how this is done. The venturi is used to control the flow of air from the shop air source. As the air flows into the venturi it draws a vacuum through the passage which leads from the holding fixture. A quick-connecting air hose, shown in the photographs, aids in the rapid loading and unloading of the fixture.

How It Helps

Martin uses this tool in a variety of applications. It successfully operates a large vacuum chuck, holding sheet material during milling operations. Quick loading and unloading means more productivity from the milling machine. Vacuum holding tools of this type are desirable when conventional clamping would cause interference or buckling of the sheet material. Compare this with the use of a vacuum pump as shown in Figs. 5 and 6 on the opposite page.

The venturi fitting is also used to apply vacuum in making large plastic boxes. When the box is ready for the molding operation, a large plastic sheet is placed over it and sealed air-tight. Air is then evacuated from between the box and the plastic sheet. The result is an even pressure over the whole surface of the box during the molding process.

Another use for this venturi fitting is with a vacuum rivet tester for checking rivets in the hull of the new P6M-1 Martin SeaMaster Flying Boat.

Whenever vacuum power is needed, consider your own shop air supply. your best bet for quick, cheap vacuum supply, particularly if you don't already have a vacuum pump.

There are lots of jobs for a vacuum in the plant of Glenn L. Martin in Baltimore—vacuum-holding tools of all types—as there are in many metal-working plants . . . Here's how they use compressed air to do the job without the maintenance expense and inconvenience of the vacuum pump

Replace Vacuum Pumps, at 1/10th Cost

Fig. 3. Here it aids in molding plastic boxes. The vacuum evacuates the air from between the polyethylene sheet and the box form and creates even pressure over entire surface

Fig. 4. One other use for the vacuum fitting shows its versatility in the Glenn L. Martin plant. In this illustration the hull rivets on a SeaMaster are tested for watertightness

Fig. 5. This photograph shows the vacuum pump in use at the Martin plant in Baltimore. It is a comparatively cumbersome piece of equipment and had to be moved to the jobs

Fig. 6. In this photograph the venturi fitting draws a vacuum on the sheet material in the vacuum chuck. The venturi fitting eliminates the cost and maintenance of the pump

This close-up shows two of the lamps suspended from the shop-built bracket which also holds the ballast

Why C-E Chose Mercury High-Bay

It Proved Lowest in Power, Maintenance, Replacement Costs

By RAYMOND E. ROEHRICK, Electrical Engineer, Combustion Engineering, Inc.

WHEN THE ORIGINAL high bay, mill type buildings were constructed for the former Superheater Company, now Combustion Engineering, Inc.'s East Chicago Division, in 1913-14, a then-modern lighting system of 7 foot-candles was installed. This consisted of a center 1000 watt clear incandescent lamp, and two 500 watt incandescent side lamps in eliptical, white enameled reflectors, mounted on the side columns.

Buildings consist of 92 by 420 ft bays, with a lamp-mounting height of 30 ft. Due to the gradual changes in manufacturing practices, requiring better seeing conditions, improvement in lighting standards and techniques since 1914, and a general rehabilitation and color conditioning of the plant, it was decided to replace the obsolete lighting system.

In the selection of a new lighting system we looked for a system which, once installed, could be operated and maintained most economically. Therefore, the installation costs and design of the system would be more or less governed by this objective. As the installation cost occurs only once, and the costs of power, lamp replacement, fixture cleaning, etc., are continuing factors, it was decided that the new system should be designed to lower these costs so that the true economies of a well-planned lighting installation could be effected.

A large percentage of the work performed at this plant consists of the bending and welding of boiler tubing which, having a non-reflecting surface, presented no reflected glare problem.

A sample installation of a standard open-type, so called high-bay, porcelain-enameled fixture was installed with a combination of incandescent and mercury lamps. It was found that at the end of approximately 3 months the original 25 foot-candle output was cut to approximately 13 foot-candles, due to dirty reflectors caused by welding smoke and fumes. It was economically unsound to wash the fixtures every 3 months, as this had to be done on premium time. Still, we would have had investment and power costs of approximately 50 per cent greater than was actually required for an output of 13 foot-candles of light.

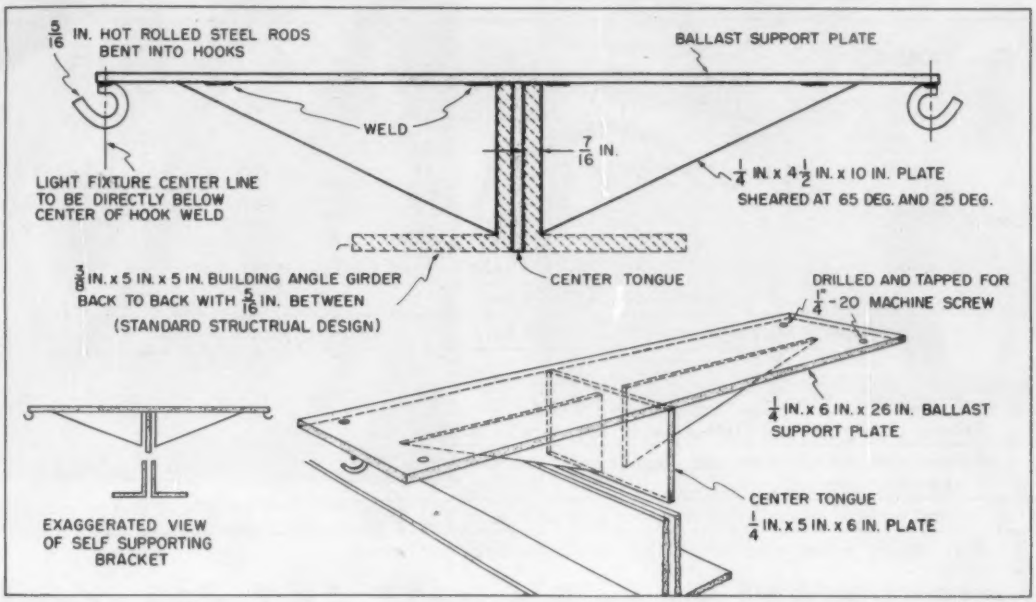
With the use of the 3000 watt mercury tubular type high bay lamps, in open reflectors, the losses can be severe if the fixtures are not cleaned at regular intervals.

It was decided that as far as we were concerned the open-type lighting units were only suitable for low-bay installations, where they could be serviced at any time. We therefore compiled figures on three types of lighting, and of designs best suited to our needs.

System No. 1 was the 100 per cent incandescent, consisting of 750 watt R 52 lamps, with the built-in silvered reflecting surface, and installed in a simple RLM type fixture for protective purposes only.

System No. 2 was a combination system, consisting of a 750 R 52 incandescent lamp and a H 400 R1 mercury lamp, each with its own silvered reflector, and installed in simple RLM type fixtures for protective purposes.

System No. 3 was an all-mercury system, consisting of the standard type 400 watt mercury lamp, the 400 A H1, installed in a high quality lighting fixture, having a focusing type alzak finished inner reflector, and a gasketed glass enclosing cover on the bottom.


5/16 IN. HOT ROLLED STEEL RODS BENT INTO HOOKS
BALLAST SUPPORT PLATE
WELD
7/16 IN.
1/4 IN. x 4 1/2 IN. x 10 IN. PLATE SHEARED AT 65 DEG. AND 25 DEG.
LIGHT FIXTURE CENTER LINE TO BE DIRECTLY BELOW CENTER OF HOOK WELD
3/8 IN. x 5 IN. x 5 IN. BUILDING ANGLE GIRDER BACK TO BACK WITH 5/16 IN. BETWEEN
(STANDARD STRUCTRUAL DESIGN)
CENTER TONGUE
DRILLED AND TAPPED FOR 1/4"-20 MACHINE SCREW
1/4 IN. x 6 IN. x 26 IN. BALLAST SUPPORT PLATE
CENTER TONGUE
1/4 IN. x 5 IN. x 6 IN. PLATE
EXAGGERATED VIEW OF SELF SUPPORTING BRACKET

Details of construction of the two-lamp, two ballast bracket. Bracket is self-supporting, grips building on girders

System No. 3, the all-mercury system, was selected on the basis of having the lowest operating power cost, the lowest maintenance cost, including the labor of lamp replacement, and the lowest actual lamp renewal cost.

The standard 400 watt mercury lamp, the 400 A H1 with its attendant bluish white color still has many advantages, in our opinion, over the newer fluorescent-coated type lamps. It provides greater contrast between

Table I. Analysis of advantages and disadvantages of three different types of high-bay lighting considered by C-E

Advantages and disadvantages of the three possible alternatives: incandescent; incandescent and mercury; and mercury.

1.—All Incandescent

Yellow to white color, lowest installation cost, highest power cost, average lamp replacement cost, and highest maintenance cost.

Not adversely affected by voltage fluctuations. Attains full brilliance immediately; no warm-up period required.

2.—Incandescent and Mercury

Yellow to blue-white color, average installation cost, average power cost, highest lamp replacement cost, and average maintenance cost.

This, while not being the most economical type, is the best lighting for high bays. One component minimizes the bad features of the other.

3.—All Mercury

Blue-white color, highest installation cost, lowest power cost, lowest lamp replacement cost, and lowest maintenance cost.

These lamps require a 7 minute period to attain full brilliancy. When turned off, require 7 minutes to cool and 7 minutes to full light output again. Using a 2 lamp ballast, one lamp will extinguish at 10 per cent under voltage and one at approximately 40 per cent under voltage. Used almost exclusively by metal working industry for high bay lighting because of its long life characteristics, and its ability to make surface markings and defects on steel to appear more pronounced.

Should be used with some form of emergency incandescent lighting.

Table II. Detailed analysis of initial cost, plus power maintenance, lamp replacement cost calculated for 5-year period

INITIAL COST				
1	For 60 lighting units, labor and material	$ 4,456.00		
2	For 30 units of each type, labor and material		$ 5,296.00	
3	For 60 lighting units, labor and material			$ 5,602.00
POWER COST				
1	128 hr per week for 5 yr period—or 1,497,600 kwh	14,976.00		
2	128 hr per week for 5 yr period—or 1,198,080 kwh		11,980.80	
3	128 hr per week for 5 yr period—or 898,560 kwh			8,985.60
MAINTENANCE COST				
1	Relamp each of 60 units 16.6 times or approach units 996 times	2,490.00		
2	Relamp mercury 5.5 times and incandescent 16.6 times or approach units 663 times		1,657.50	
3	Relamp each of 60 units 5.5 times or approach units 330 times			1,237.50
	Plus washing fixture reflectors, 12 per group as lamps burn out			
LAMP REPLACEMENT COST				
1	996—750WR52 incandescent lamps @ $3.00	2,988.00		
2	498—750WR52 lamps @ $3.00 and 165-H400R1-mercury lamps @ $17.50		4,381.00	
3	330—400W-AH1-mercury lamps @ $8.40			2,772.00
	LIGHTING COST FOR 5 YEARS	$20,454.00	$18,019.30	$12,995.10

SUMMARY:

The savings on power, maintenance and lamp replacement using system No. 3 instead of No. 2 is $4,024.20, and will pay off system No. 3 installation cost in approximately 5.6 years.

The savings on power, maintenance and lamp replacement using system No. 3 instead of No. 1 is $7,458.90, and will pay off system No. 3 installation cost in approximately 3.8 years.

the background and the lines and lettering in the reading of blue or white prints, making for less errors. It gives a three-dimensional look to metal surfaces having various levels or imperfections, against a flatter appearance when using incandescent or mixed lighting.

Color bands such as white, blue, gold, etc., other than red or brown, placed on tubing for its identification, literally knock your eye out with contrast under this light, making identification possible from a much greater distance. Also, there is seldom any real objection from male employees, unless they are extremely color conscious, or are working on a job which actually requires the newer fluorescent mercury type lamp or a combination of mercury and incandescent lighting. Finally the cost of this lamp is only about half that of its more modern counterpart, with identical life expectancy.

As much as possible of the system selected, was prefabricated in advance of actual wiring. A combination fixture and ballast, self supporting hanger unit, of ¼ in. steel plate was designed so it could be placed over the building girder without bolting or welding, and with the ballast, fixture receptacles and fixture hanger hooks already installed. Also, the switching unit was preassembled on a steel plate, and the whole unit welded to the building column. Most of the conduit bends were made from sample bends, in advance also.

Power source for the system is 440 v, 3 phase, 60 cycle, connected for a maximum of 300 volts to ground. The fixtures each have a 3 ft length of three-conductor heat-resistant flexible cord, approved for the purpose, and terminated in a three-prong, twist-lock type plug. One of the three conductors is used as a safety ground between the fixture and the building structures, although not required by the code. The lighting is switched with 3-phase contactors and selector switches, one phase feeding across each 92 ft girder to eight 400 watt lamps.

Total weight of a complete lighting unit with 2 fixtures and the two-lamp ballast is approximately 100 lb. The fixtures are hung on hooks and have shock-absorbing type sockets.

In the operation of the system the lamps are turned on on a Monday morning and off on a Saturday evening, a total of approximately 128 burning hours per start. The maintained foot-candles of the system is approximately 25, and the color of the standard mercury lamp has met with no objection whatsoever.

There are four pair of fixtures, consisting of two fixtures each, mounted on the 92 ft long girders spanning the bay. The spacing between girders is 21 ft, and there are sufficient number of individual fixtures installed, so ap-

(Continued on page 196)

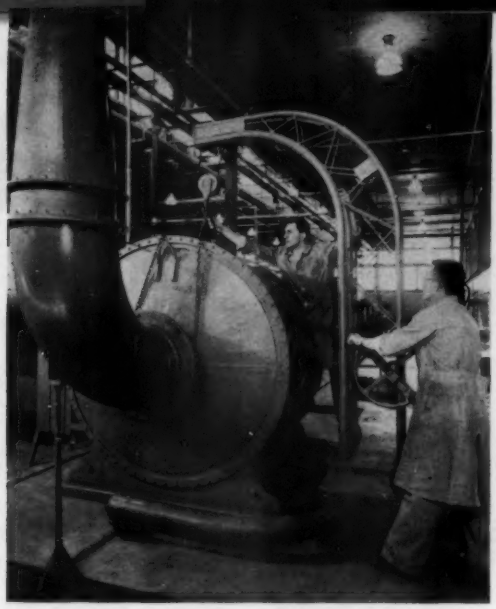


Fig. 1. For moving this 60 hp turbo-compressor into place, a 5000-lb capacity portable floor crane is used

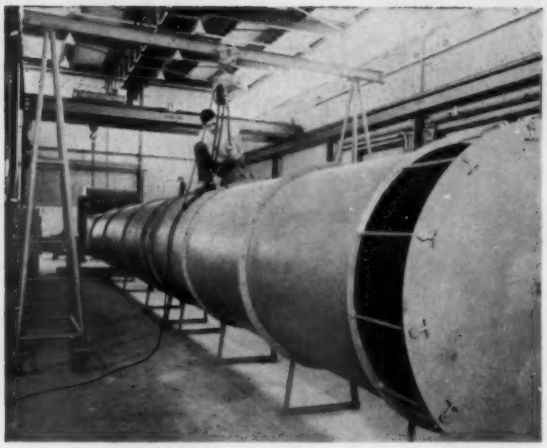


Fig. 2. Bridge, 2000-lb capacity, 10 ft high, supports one-ton electric hoist

Research Lab Has a Lot of Lifts

RESEARCH laboratories are often associated with working models, white coats, test tubes and materials handling problems no greater than lifting a pencil. Not so at the Trane Company's Research and Testing Laboratory at LaCrosse, Wisconsin. Their problems range from the minute to the massive, and their overhead handling equipment shows that they planned for any size problem.

Lift trucks, dollies, pallets and the unglamorous "push" get things moved horizontally, but for vertical transportation, Trane provided its research engineers with lifting devices in sizes ranging from one ton to 10 tons.

Obviously, the lab is not one of the usual research variety, primarily because of the size of equipment tested. Compressors, refrigeration systems, fans and ductwork — even outsize heat exchangers — get put through their paces as Trane develops its products.

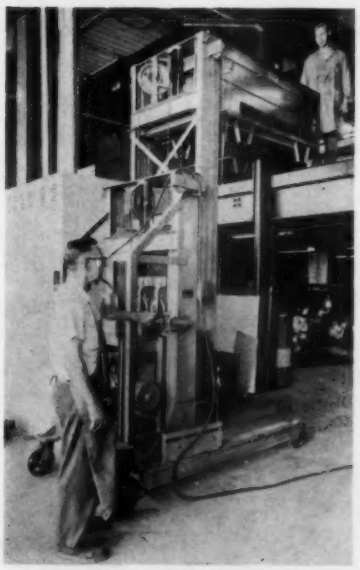


Fig. 3. For lifting to the balcony level, a portable power elevator is employed

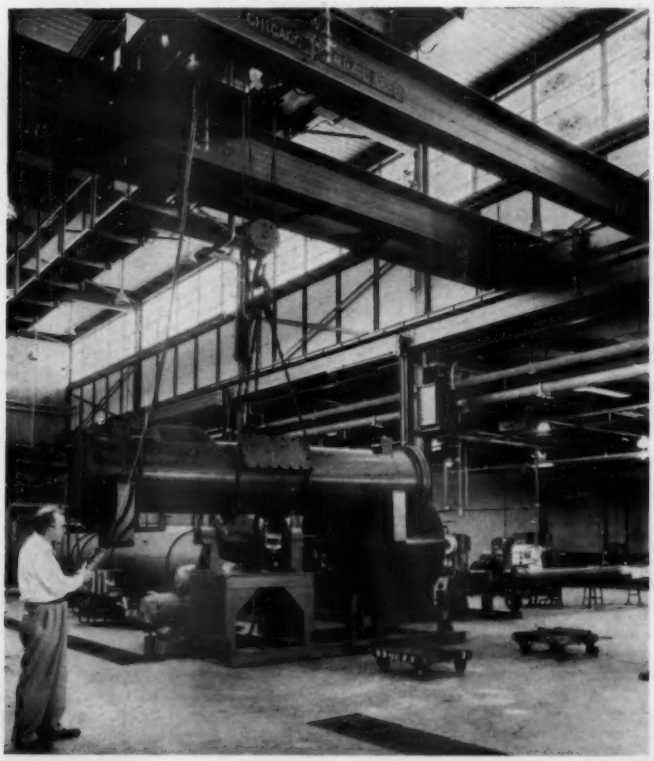


Fig. 4. On the big jobs, the 10-ton traveling bridge crane goes into action

Plant engineers inspect one of Delco's production operations, the coining of the seat of a direct-action shock absorber piston. Left to right: E. V. Anderson, Allison Division; J. Q. Holmes, Production Engineering Section; C. E. Bryan, Allison Division; M. A. Pratt, New Departure; C. Hauser, Cleveland Diesel Division; and D. L. Lawrence, Euclid Division

GM's Plant Engineers Committee—

Fact-Finding Group Investigates, Solves Mutual Problems

IN THE PAST, PLANT ENGINEERING has presented articles on the workings of multi-plant engineering organizations. Probably one of the most effective of such groups, and also one of the most experienced, is the Plant Engineers Committee of General Motors Corporation. Even more important to the profession of plant engineering is a statement made in the Corporation's 1955 Plant Engineers Committee booklet: "Members of the Committee represent the Corporation in outside national societies and organizations concerned with plant engineering and related subjects, and support any codes, etc., which are advantageous to the Corporation."

Five meetings of plant engineers in the General Motors Corporation are held per year. Two of these are the "Plant Engineers Committee," and the other three meetings are comprised of members of the "Plant Engineers Supervisory Committee."

The latest meeting of the Plant Engineers Committee was held on October 27 in the main administration building of Delco Products Division, Dayton, Ohio.

As pointed out in the Booklet: The Plant Engineers Committee is comprised of Divisional Plant Engineers responsible for: buildings and land improvements; power plants; utilities; equipment maintenance; waste disposal and other facilities; construction and maintenance of these items; and for keeping them up to a standard of operation which will render the most effective service to the manufacturing units in which they are located.

The Plant Engineers Supervisory Group is comprised of chairmen of the seven sub-committees and it operates under the jurisdiction of the Plant Engineers Committee. This Supervisory Group is what might be termed the "administrative group." It is the responsibility of these men to carry on investigations of projects assigned by the Main Committee headed by John Q. Holmes, General Motors Production Engineering, Tech Center, Detroit. Further, it must scrutinize all subcommittee reports in order to determine their adequacy before presentation to the Main Committee for acceptance or rejection; it outlines programs for meetings; investigates the value of new subjects and, most important, encourages members to assume a more active interest in committee work.

The seven subcommittees making up this supervisory group are: 1. Build-

ings and Land Improvements; 2. Electrical Standards for Construction; 3. Electrical Standards for Industrial Equipment; 4. Equipment Maintenance; 5. Hydraulic Standards for Industrial Equipment; 6. Industrial Ventilation; 7. Power Plants and Utilities.

It is apparent that, by means of these seven subcommittees, the GM Plant Engineers have been able to encompass all plant engineering activities; it is true that some are considerably broader than others (Buildings and Land Improvements as compared to Industrial Ventilation) but the basic plant engineering job responsibilities have been well broken down.

While it is obviously impossible for the Committee to discuss, in the course of one meeting, all problems with which the subcommittees deal, an inspection of the agenda for the October meeting reveals a respectable breadth of interest and an insight into current GM plant engineering problems.

First, a report on electric motors which emphasized design factors affecting plant or industrial motors; maintenance as affected by design and construction of motors; and distribution interchangeability and field service of motors.

T. W. Bradford, Plant Engineer, Pontiac Motor Division, addresses the group on Pontiac's use of punched card systems in electrical maintenance records

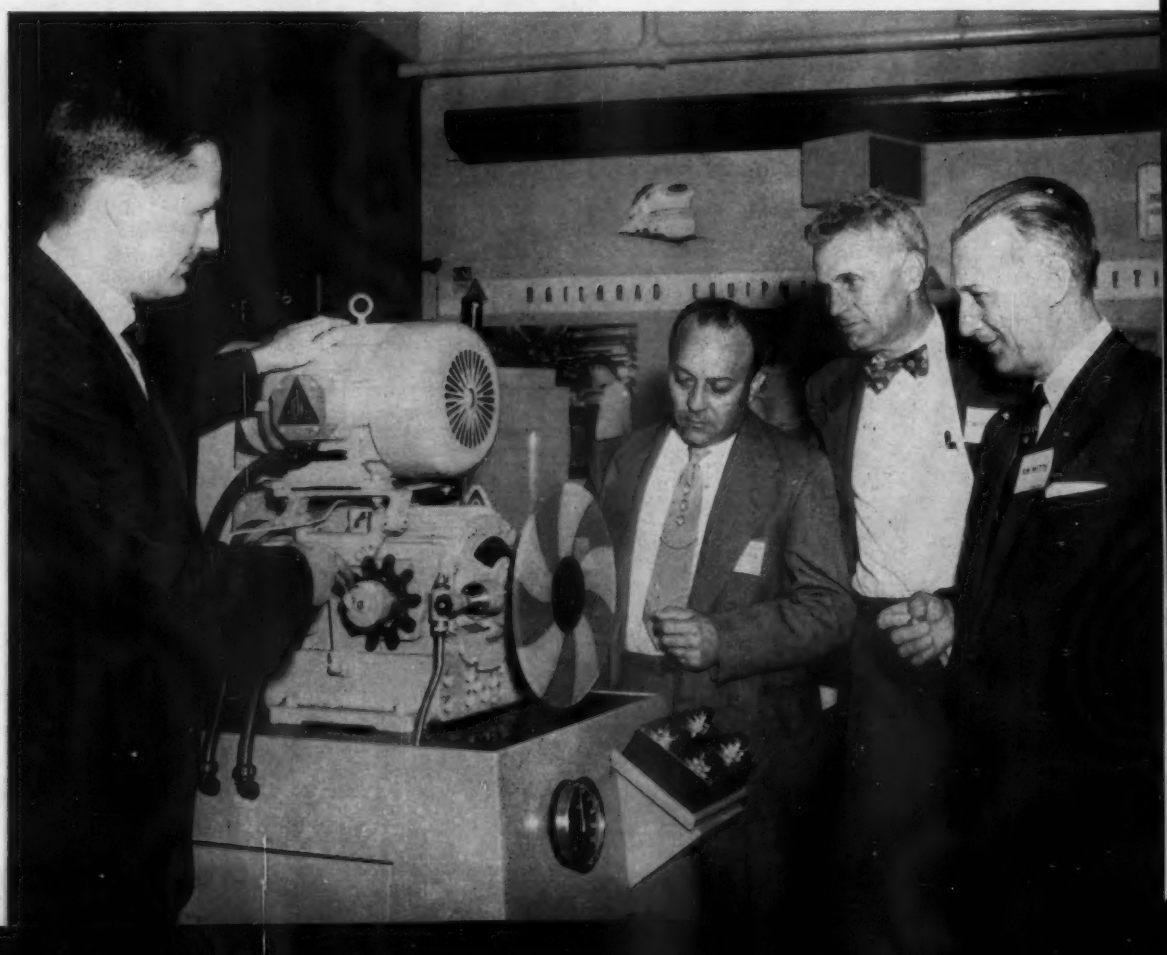
Second, T. W. Bradford, Liaison Member of the subcommittees and Plant Engineer, Pontiac Motors, described Pontiac's use of punched cards for recording maintenance of electrical equipment.

Third, W. W. Webster, Plant Engineer, Harrison Radiator Division, Lockport, Chairman, Equipment Maintenance Subcommittee, reported on the formulation of recommended practices for the preservation of machinery, equipment, gages and tooling.

Fourth, R. W. Mitte, Plant Engineer, Ternstedt-Detroit, Chairman of the General Advisory Committee on "Plant Engineering for Hazardous Materials" summarized progress made to date with a manual on the subject.

Other items on the agenda were: Water Conservation and Contamination; New National Machine Tool Builders Electrical Standards, and Noise Levels in Industry.

Earl Wilson explains a new application for Delco motors to C. E. Bryan, Allison Division; C. F. Wittlinger, General Superintendent, Land and Buildings Construction, Delco Products Div.; R. W. Mitte, Plant Engineer, Ternstedt Division



NEW DEVELOPMENTS

Coating Process Gives Plastic Protection to Metal Parts

FOR COATING METALS, ceramics, glass and wood with plastic materials, the Whirlclad Process serves to combine the natural advantages of the plastic materials with those of the parent metals to be coated. Invented in Germany, the process is licensed in this country by Polymer Processes, Inc.

In this process, parts are dipped into fluidized bed of plastic material to obtain highly uniform coatings—and much heavier coatings from a single dip

Preliminary experience has been based largely on use of nylon and low-pressure polyethylene. However, other coating mediums which melt sufficiently below their degradation temperatures can be used, it is pointed out, including polystyrene, cellulose acetate, butyrate, acrylics and epoxy resins. Polymers used are prepared in finely divided solid form, but are essentially pure in that they normally contain only modifying agents—no plasticizers or solvents are required.

The method requires relatively inexpensive apparatus, and consists of dipping preheated articles into a fluidized bed of plastic material in finely divided solid form. Melting point of the material to be coated must be higher than that of the coating material. To obtain best adhesion, the surface of the article to be coated is roughened by shot blasting.

Want further details? Just write "Whirlclad" on Reader Service Card

Wall System Provides Easy Way to Transform Old Walls and Ceilings

SIMPLICITY OF INSTALLATION is offered in Snap-On-Walls, an interior wall system developed by Erdle Perforating Co., Inc., with assistance from Aluminum Co. of America. In this system, five different extruded aluminum channels form the basis for the snap-on, snap-off wall. Included in the extrusions are inside and outside corners, edging, firring and the snap-on members.

According to manufacturer, a complete room installation can be accomplished in a few hours with a hammer or screwdriver. Once the firring, edging and corner channels are in place the major part of the work is finished. Channels can be attached to the old walls, or studs with nails or screws. If desired, adhesives can be used.

Little effort is needed to transform an old wall. The new panel clicks into position in the aluminum channels. The two aluminum extrusions shown below form basis of the Snap-On-Walls

Perforated hardboard or metal panels are then inserted in the snap-on member and clicked into place. By snapping panels into or out of position, walls may be replaced, painted or cleaned. Many variations are available. By using perforated panels with sound absorbing material between panel and wall, the system makes possible an acoustical wall as well as a decorative one. The snap-on feature also permits easy installation of acoustical ceilings. For coverage of high walls and large ceiling areas, the aluminum channels are available in lengths from 8 to 20 ft. and perforated and metal panels in widths up to 4 ft.

For more information on this system, write "Snap-On Walls" on the Reader Service Card, page 201-202. Or write to Equipment Editor, PLANT ENGINEERING, 110 S. Dearborn, Chicago 3.

AND APPLICATIONS

Boiler Return System Recovers Heat and Cuts Steam Costs

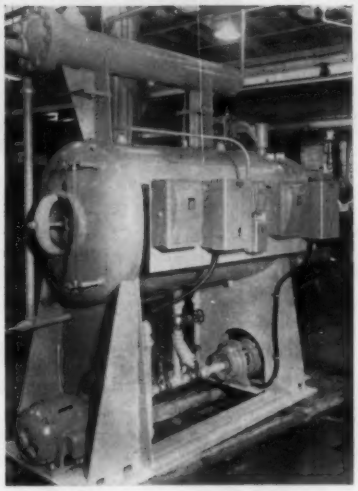
THIS READY-TO-INSTALL unit announced by The Patterson-Kelley Co., Inc., recovers heat otherwise lost to atmosphere, uses it to preheat incoming water for processing. It also reheats condensate plus make-up water to near steaming temperature and returns it to the boiler. The unit incorporates a condensate cooler and receiver, feedwater heater and controls, pumps, piping and accessories. The cooler is an integral part of the condensate receiver.

Purpose of the unit is to cool condensate from high pressure processes below flash point before it enters the receiver. To do this, it uses the heat in the high pressure condensate to preheat incoming water for processing—reducing the demand on the boiler and saving on fuel and steam costs. Since the condensate is already hot, it has only to be brought to near steaming in the feedwater heater.

In this system, high pressure condensate enters the cooler and, after being cooled below flash point, is discharged into the receiver. Incoming water, circulated through the cooler takes heat from the condensate. Thus, preheated, it is piped to the hot water storage heater for elevation of its temperature to that used in processing. Hot condensate from the receiving tank is pumped to the feedwater heater.

The condensate cooler, a shell-and-tube heat exchanger, has a cooling surface of sheathed copper tubing. Condensate enters the shell as high as 100 psig and 337 F, is cooled to 197 F by incoming water circulating in the tubes. Flash steam is condensed. Recovered heat is transferred to incoming water in the tubes. Cooled condensate is discharged into the receiver. The feedwater heater, also a shell-and-tube exchanger, raises the temperature of the condensate pumped to it. Feedwater, consisting of reheated condensate plus necessary make-up water, then flows to the boiler.

For more data, write, "P-K Unit" on the Reader Service Card, page 201



Designed to stand 125 psig, this packaged system comes in 11 sizes, 30 to 300 bhp. In it, the condensate cooler is an integral part of the receiver, and the closed boiler feedwater heater is mounted atop the condensate receiver

Fluorocarbon Plastic Laminate Resists Heat and Chemicals

DEVELOPED BY The M. W. Kellogg Co., this new laminate consists of a thin—10 to 12 mil—continuous layer of Kel-F Plastic on glass cloth. According to Kellogg this can be adhesive-bonded to almost any contoured surface. Vessels ranging from rectangular plating tanks to complex reactors involving flanged pipe connections and dished heads have been lined with it. Economy-wise, it is reported that this laminate installed on carbon steel is more than competitive with many alloy metals.

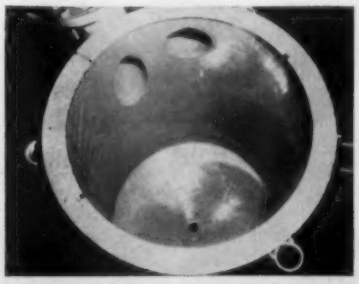
Laminate for the process (produced by Garlock Packing Co. and U. S. Gasket Co.) is available in sheets, which can be cut with knife or tailor's shears, and can be cold or hot formed to flat or curved surfaces. Installing Kel-F Plastic Laminate involves: cleaning and roughening the surface to which the laminate is to be cemented; cutting and fitting the laminate; applying adhesive; holding laminate in place until adhesive sets; sealing seams; and testing electrically for pinholes and incomplete seams.

Properties of the laminate sheets parallel those of the plastic with which they are produced, says Kellogg, including resistance to temperatures approaching 400 F and low temperature flexibility; high resistance to chemicals; low permeability to moisture and vapors; high abrasion resistance and tensile strength; low cold flow, high impact resistance, high dielectric and electrical resistivity; nontoxic and nonsticking characteristics. This fluorocarbon plastic laminate is suggested as a lining for tanks, pipe, chutes, hoppers and ducts.

For details, write, "Kel-F Plastic" on the Reader Service Card, page 201

Here Kel-F Plastic has been cold formed into the bead and onto the lugs of an open-head pail cover. Laminate was held in contact with cover by a shaping pattern until adhesive set

Alternating exposure to corrosive contents at temperatures from 0 to 180 C —and to impact of fast moving chunks of ice show no effect on this acid quench tank lined with Kel-F Plastic



Well-cleaning operation at Granite City Steel Co. is directed by Author H. L. Lewis, extreme left, Plant Engineer of the Company's Blast Furnace Division. Other men in photo are W. A. Holton, general foreman; J. T. McFarland, district manager for Calgon, Inc., E. F. Posage, chemical tester

Water Well Capacities—
Improving Them and Maintaining Them

By HAROLD L. LEWIS, Plant Engineer, Blast Furnace Dept., Granite City Steel Company

DUE TO THE FACT that our blast furnace, coke oven and by-product plant operations require an ample quantity of cooling water, we have always considered it important to provide sufficient well water capacity and to maintain our present water wells at peak capacities. The well water in this area is high in bicarbonate hardness and in dissolved iron content. Moreover, the well water is almost always seeded with iron bacteria.

In view of this, it is not surprising that the wells in this area lose capacity quite rapidly due in large part to calcium carbonate and iron oxide deposited from the water on the well screens and in the pump bowls.

Until it was found that much of this lost capacity could be recovered by chemical cleaning of the well periodically, this plant was forced to abandon completely many wells. Some idea of the rapidity with which this loss of capacity can occur may be gained from the record of our No. 13 well which was placed in operation in June, 1949. It is a gravel-packed, steel-cased, 1500 gpm well which upon initial test in June had a specific capacity of more than 80 gpm per foot of drawdown. By December of that same year the specific capacity of this well had fallen to 50 gpm per foot of drawdown. This was undoubtedly caused by sand blocking, since the water produced from this well during this period of time was comparatively low in iron content.

All of the wells have 24 or 26 in. casings and are approximately 105 ft in depth. At the present time this plant has nine wells in operation,—one concrete cased, all others steel cased, and several gravel packed. In the past acid had been used to clean the older wells but the expense and inconvenience of using the acid left a lot to be desired.

Water-bearing strata in this area is sand and gravel extending from about 70 to 105 ft below ground level and near the Mississippi River bed. It is peculiar in that fine sand may be present in any particularly limited area, necessitating close attention to screen slotting sizes. Some wells perform very nicely while occasionally one particular well may, after cleaning, show good improvement over a reasonable period of time and then fall off rapidly. Again the reduced capacity may show up within a short time after a cleaning operation. "Back-washing" the well in most cases will remedy such a situation.

We have also noted that the iron content of one well may vary materially from another well at the same depth and within a relatively short distance from the first well. Until test holes are actually put down and the water analyzed the iron content may be problematical. Further, the initial iron content will invariably be higher than that obtained after pumping the well for a month or two.

Several years ago we heard of a new method of cleaning water wells which employed Calgon[1], a sodium phosphate glass, rather than acid as the cleaning agent. We were familiar with the use of Calgon in the threshold treatment of industrial water supplies having used it in some of our cooling water systems for some time to stabilize the dissolved iron present in the well water and to prevent the deposition of calcium carbonate scale. When Calgon, Inc. developed the use of this material in well cleaning we decided to try it since it worked on an entirely different principle from the acid and there was a good chance that it would

be more effective. Moreover, its use appeared to be a great deal less expensive from the standpoint of both chemical and labor costs and the simplicity of the treatment was most appealing. In addition, we had a sufficient amount of it already on hand in the plant for at least one or two wells.

It seems that the cleaning action of this glassy phosphate depends upon loosening and dispersing the minerals deposited in the well rather than upon neutralization and complete dissolution as in the case of acid. Therefore, a great deal of agitation is necessary during the cleaning operation and adequate flushing of the well afterwards is required to remove the loosened particles.

Chemical Action

That its cleaning action, however, does not depend entirely upon its dispersive properties is demonstrated by the fact that the water flushed from our wells after cleaning is usually very high in hardness and dissolved iron which indicates that the metaphosphate may actually form a soluble complex with some of the deposit.

It was first decided to try it on our No. 2 well which was in the worst condition since the specific capacity had fallen to only 9.5 gpm per foot of drawdown. We added our first charge, previously dissolved in water, to this well, then surged or churned the well one dozen times by starting and stopping the well pump so that the water column was brought to the surface and allowed to fall back into the well again without discharging any water. Since we had had previous evidence to indicate that iron bacteria may be growing in the wells we then added a 50 pound charge of calcium hypochlorite and again churned the well one dozen times.

Two hundred gallons of water was next poured down the well to carry the chemicals back into the water strata. The well was then surged rapidly 12 times each two hours for a 48 hr period and was then flushed to waste. During the flushing period which lasted about 2 hrs, the well pump was stopped and started several times to provide some agitation and to remove suspended matter.

Character of the suspended solids appeared to be somewhat different in the first and second flushing operations and samples of this suspended matter were taken in each case for later identification. We were quite surprised to find that during the first flushing operation the suspended matter was composed principally of amorphous silica with a minor amount of hydrated iron oxide and calcium carbonate.

During the second flushing the suspended matter proved to be primarily calcium carbonate with minor amounts of iron oxide, feldspar, and quartz. The presence of the amorphous silica, feldspar, and quartz, in the flush water did indeed indicate that the Calgon was removing many substances not easily affected by acid which appeared to substantiate the claim that this material might give better results.

As a matter of fact, a flow capacity test of the well proved that the specific capacity had risen from 9.5 gpm per foot of drawdown to 31.2 gpm per foot of drawdown, an increase of 228 per cent. This was considered to be quite remarkable.

Although several charges of this glassy phosphate are recommended for the proper cleaning of a well, in view of the good results which we had obtained with only one charge it was decided that we would use a single charge on the other wells before attempting further cleaning on the No. 2 well. We therefore decided to next clean the No. 9 well since the specific capacity of this well was also very low. We cleaned this well using the same procedure as given above for well No. 2, with the exception that several successive charges of Calgon were used, and it was then found that the capacity went up to 1200 gpm, a 300 per cent increase over that obtained with acid previously. This well was then immediately throttled back to 750 gpm to avoid the possibility of pulling fine sand into the well. After throttling with a 6-in. orifice the specific capacity of the well was 30.0 gpm per foot of drawdown compared to 14 gpm per foot of drawdown before cleaning.

After observing the good results obtained with these materials in cleaning wells No. 2 and No. 9 it was decided that all of our wells would be cleaned with at least one charge once each year as a means of maintaining the peak capacities of these walls. We were able to clean six of them in 1949 and again in 1950 we cleaned all wells with one or more charges.

Overall results of our two year program were tabulated and recorded showing the difference in drawdown and capacities before and after cleaning in both years, as a guide to our future program. In this two year period we managed to increase the specific capacity of all of our wells by an average of 88 per cent which at that time provided us with sufficient water. More important, we demonstrated that we could maintain these capacities by cleaning the wells periodically. However, in order to maintain peak capacities it had been found that many of the wells require cleaning once every six months rather than once each year.

In securing the test data on all of the wells a 6-in. orifice was used to throttle the discharge in order to obviate any possibility of pulling sand into the well. Therefore, the benefits of this cleaning program cannot be judged by the increase in total capacity alone since the wells were seldom pumped at maximum capacity.

In view of this the decrease in drawdown as well as the increase in total capacity must be used as a criterion in judging results. The specific capacity, of course, takes both of these factors into consideration. Total improvement in drawdown and capacity was included in our records for the two year period. With this rehabilitation program we increased the total capacity of the wells 34 per cent while reducing the drawdown by 21 per cent. The 21 per cent reduction in drawdown means a reduction in total pumping head of 9.2 per cent.

Reference has been made to the period 1949-1951 since close records were kept through that period to get a close approximation of the progress being made. Since that time the cleaning operation has become routine and a quick check on the specific capacity in gallons per minute per foot of drawdown has served our purpose.

In the case of at least one well, much of the reduction in specific capacity was no doubt due to sand blockage which of course cannot be eliminated by means of chemical cleaners.

Results Analyzed

Through the cooperation of Calgon, Inc. an analysis was made of each of the well waters during the flushing operation and the suspended matter was identified by means of x-ray diffraction and the petrographic microscope. In each case it was found that the well water during the flushing operation would be very high in dissolved solids as well as suspended solids, the hardness of the water sometimes reaching 2500 ppm and the iron content 100 or 200 ppm. A few of the substances flushed from the various wells as suspended matter were amorphous silica, hydrated iron oxide, calcium carbonate, feldspar, quartz, iron carbonate, hematite, magnetite, magnesium silicate and of course calcium phosphate resulting from the reaction of the glassy phosphates with the calcium deposits.

As a whole, we have found the use of this material[1] to be quite valuable in restoring and maintaining the capacities of our water wells and it is now planned to continue.

[1]Calgon, Inc., now makes a new product called Weltone as a successor to Calgon for well cleaning. It was developed in response to the need for a complete product containing all of the necessary chemicals for best results. Besides Calgon, Weltone contains a disinfecting agent and wetting agent, to improve the cleaning process.

Fig. 1. Roller gage being used to test thickness of plastisol protective coat

Fig. 2. Workman holding plating basket that has been protected by plastisol

Fig. 3. Plastisols can also be sprayed

Plastisols—

Muscle Men in War on Corrosion

By D. R. **MESERVE**, United Chromium Div., Metal & Thermit Corp.

SINCE THEIR COMMERCIAL introduction some eight years ago, plastisols have gained the growing attention of plant engineers and maintenance men as an effective low-cost protective material to reduce surface wear, corrosion, and other special plant applications.

Plant engineers will find application of plastisols in this wide range of uses: fan blades and fume ducts for protection against corrosive atmospheres; steel drums to protect against product contamination; conveyor rollers to reduce the noise level; wiring harnesses to resist moisture and fungus; dies to protect delicate surfaces; electrical tool handles to guard against shock; even bolts, nuts and other fastening devices are now being coated for protection against abrasion.

Many plastisols develop films with high tensile strength that won't tear or scuff and will stand up under the heaviest abuse. They can outlast rubber in toughness, chemical inertness, and economy for many applications. Even surgical instruments, automotive parts, aircraft assembly fixtures, filter screens, pushcart bumpers, pipe, and pumps are now being plastisol-protected.

Supplied in liquid or paste form, plastisols are dispersions of finely powdered vinyl resins in plasticizers and usually include small amounts of pigments and stabilizers. Unlike organosols, which contain a certain amount of diluent, plastisols are 100 per cent solids which, after proper application, form dense, flexible, extremely tough protective coatings for a great variety of products.

By varying the formulation of plastisols, they can be made to serve a variety of needs. They can be compounded to yield cured films of various degrees of hardness depending on the particular plant engineering problem. Coatings as thick as 3/16 in. or as thin as 3 mils can be produced with just one application. In protecting metals against strong corrosives, the heavier film is usually specified. These insure against porosity and provide the resilient film which resists physical damage and absorbs impact without chipping or cracking.

Plant Uses

Plastisols were first used successfully in the plating field as protective coatings for racks. They have since found literally hundreds of new uses where their properties of corrosion resistance, electrical resistance, flexibility and resiliency have served to prolong the life of equipment, parts and finished products.

A large automotive plant, for example, experienced excessive maintenance costs on rubber-coated degreasing baskets, switched to plastisols and found no coating damage whatever after three years of heavy production work. Electrocleaning and rinse tanks are other examples of equipment now being plastisol coated to protect against corrosion from aqueous solutions.

In many cases, plastisols have made possible the replacement of expensive alloys with ordinary steel or cast iron. One engineer reported that his stainless steel baskets had to be coated repeatedly with beeswax to withstand the hydrofluoric acid used in etching glass apparatus. Now, ordinary steel baskets coated with plastisol not only prove more economical but also more satisfactory. An eastern applicator reports satisfactory performance from plastisol-coated half-ton cast iron strainer bodies which were formerly made of stainless steel.

Still another case is that of a chemical processor who applied plastisols to bleach reduction chambers and was able to get four times more service before maintenance, than he got previously from special alloy metals.

As vinyl based heavy duty coatings with a 100 per cent solids content, plastisols are resistant to a wide variety of the more potent chemicals used in industry. For example, they will successfully withstand such strong mineral acids as hydrochloric and sulphuric.

A large processing plant previously plagued with costly corrosion of exhaust system ducts eliminated this problem with plastisols. A non-porous coating approximately one-sixteenth inch thick applied to the duct system protects it against fumes of entrained sulfuric acid, hydrogen sulfide, and carbon disulfide. A metalworking plant protects a 13-foot fume exhaust hood used on pickling tanks with plastisol which successfully withstands hydrochloric and nitric acid fumes.

Plastisols also have good resistance to strong alkalies such as sodium or potassium hydroxide as well as such corrosives as water, aqueous salt solutions, oxidizing agents, and reducing chemicals. They will resist the action of alcohols and many wetting agents.

Plastisols can be applied in a number of ways, easily and economically — by dip, spray, roller coat, knife coat, trowel, and, in some cases, by caulking or flow-on principle. As coatings for metals, they have been most widely applied by dipping and more recently by spraying.

Most plastisols require curing temperatures ranging from 350 to 375 F. Unlike solution types of coatings which form films by evaporation of solvents, plastisols require heat to fuse into a homogeneous mass. Ingredients will remain in an unfused state until proper temperatures have been reached and held for the prescribed period of time. Upon baking, all the materials in the compound become a part of the film or self-supporting shape.

A prime coat is required to assure good plastisol adhesion. Where adhesion is not required or where strippable coating is desired, plastisols may be applied directly to unprimed surfaces. Primers are normally dipped, sprayed or brushed on and baked for 15 to 20 minutes at 300 to 350 F.

In hot dip plastisol application temperature plays an important part in controlling the degree of film thickness. Mass of the piece being dipped also effects the build-up of plastisol. Usually, the hotter the part, the thicker the applied coat.

A recent development, cold dip plastisol, makes possible considerable savings in material consumption and production time. Until now, the best speeds obtainable with cold dip materials have been 6 to 7 in. per minute. The new cold dip plastisol allows dipping speeds of 17 to 18 in. per minute and is thus ideally suited to automatic conveyor dipping equipment. In addition, the flow properties of this compound are such that it deposits approximately 50 per cent less material than previous cold dip plastisols.

A new sprayable plastisol, known as Unichrome Coating 5300, has helped eliminate some of the problems encountered with pieces too large to be dipped. Previous sprayable materials seldom provided more than 6 mils per coat, usually much less. The

(Continued on page 200)

Fig. 4. Workman in foreground is spark-testing plastisol-coated screen in search for any spots which have not been thoroughly covered by protective coating

This Machine Closes
Production Bottleneck Eased with

Limit switches, pneumatic cylinders and ingenuity team up to lick packaging problem . . . Appliance manufacturers install new equipment to handle the tough ones . . . Bottom flaps of cartons are closed automatically

Fig. 1. (above) Section of roller conveyor where bottom flaps are closed. Station is ready to receive palletized appliance unit from production area. Side plates (arrows) are extended to support unit when conveyor sections are dropped out by cylinders

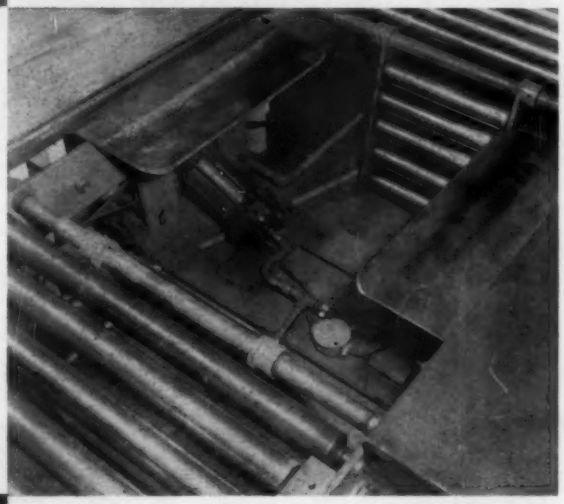


Fig. 2. (right) Packaging station as it would be with unit in position to receive carton. Conveyor sections have been dropped out to permit carton flaps to extend through conveyor, and side plates support unit. Rising conveyor closes bottom flaps

Fig. 3. (below) Two-man loading team places carton over unit on station. Operator controls conveyor drop-out and side plate movements with foot pedals. Two inner flaps go through conveyor, two outer flaps are held out for contact with glue rolls

CLOSING AND SEALING one-piece slotted corrugated boxes, packed with large products such as major home appliances, has become an almost automatic operation, with the introduction of new equipment by the Hinde & Dauch Paper Co.

Officials of the company say that compared with present methods, the new equipment allows savings up to 30 per cent in packing labor, employs considerably less floor space, provides a much faster packing operation, and in most cases, allows the use of a less costly package.

Significant features of the equipment, which was designed by H & D engineers, are a bottom flap closing mechanism and a new method of closing outer flaps for sealing.

The new bottom flap closing device eliminates the work of putting the heavy product unit inside the box. Instead, the box is put over the product while still in tube form, as the unit reaches the packing work station on the roller conveyor bringing the units from the production area, and the inner bottom flaps are closed mechanically.

This mechanical closing is achieved by lowering and raising a section of the roller conveyor as the unit is positioned above it. Pressure on a foot pedal actuates a set of pneumatic cylinders that lower the

Cartons 'On the Run'

Conveyorized Packaging Setup

Fig. 4. (above) Second of two manual operations required to package washer is insertion of top packing. Packer also closes two top inner flaps. With outer top flaps extended, carton moves into machine, where belts pick it up for powered movement

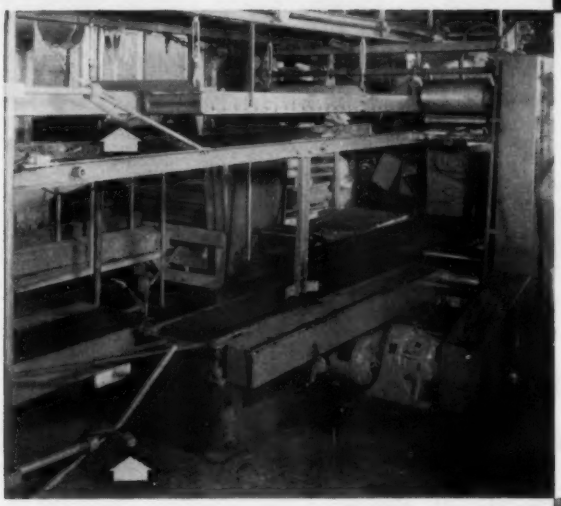


Fig. 5. (left) Belt carrier conveyor section. Cartons move through gluing rolls, then through closing section where pneumatically-operated arms (arrows) move across top and bottom faces of carton. Belt supports one side as arms seal other

Fig. 6. (below) With top and bottom outer flaps glued and sealed, carton is carried into "setting" section, where glue sets to hold carton securely. Squaring device pictured puts pressure on both sides of carton. Weighted rolls apply top pressure

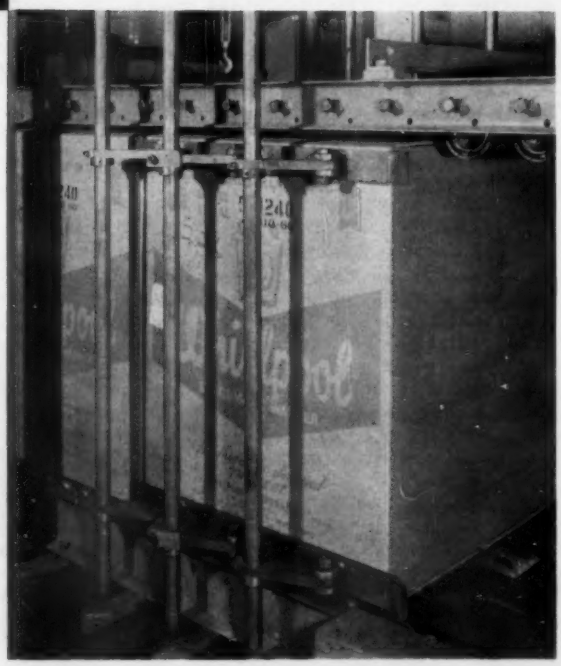
conveyor sections immediately after another set of cylinders has moved sliding plates from either side of the conveyor into position under the unit being boxed.

These side plates support the unit as the loading team drops the box over the unit. Two flaps of the carton extend through the conveyor as the carton is positioned, and these are folded up into place as the roller conveyor sections return to their normal position. As the conveyor sections rise, the side plates that are supporting the unit are retracted, and the unit is again supported on the conveyor.

The top outer flap closing mechanism is pneumatically operated. Instead of plowing the glue-covered flaps shut by moving the carton through stationary guide bars, quick-acting arms on the machine close the flaps instantaneously.

The top and bottom outer flaps on one side of the carton are closed at one position in the machine, and the opposite flaps are closed at the next position. Limit switches actuate cylinders that move the closing arms across the faces of the carton.

Now in operation on washing machine lines of Whirlpool Corporation in Clyde, Ohio and Hotpoint Company in Chicago, the machine is available through Hinde & Dauch, Sandusky, Ohio.



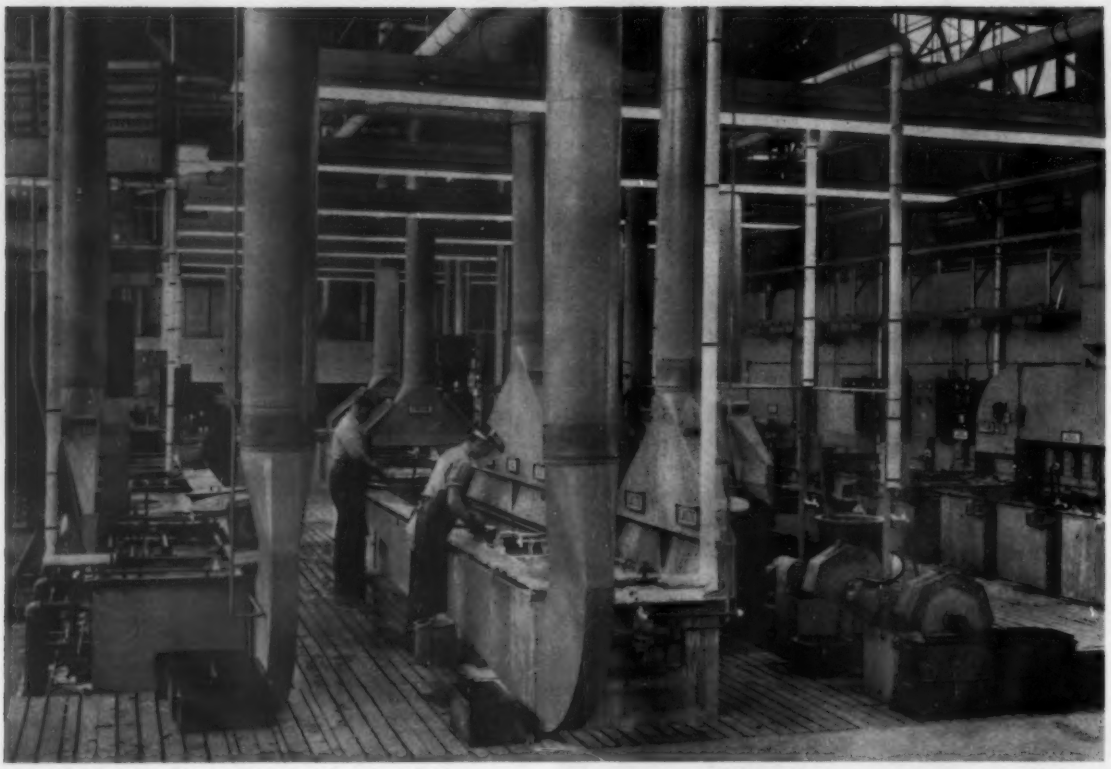


Fig. 1. "Push-pull" ventilation systems installed in plating department of midwestern plant have outside air supply

Why Use "Push-Pull" Ventilation?

Article Tells How it Works, How it Can Effect Savings

By GUY E. WALLIN, Consulting Ventilation Engineer, Chicago, Illinois

EXHAUST VENTILATION of tanks is a plant engineering responsibility that can be quite challenging. Perhaps, its value and also its price can be better appreciated through some consideration given to just the ordinary garden variety type of ventilation. I shall describe push-pull ventilation which costs more to install but a great deal less to operate. This is true particularly in the winter time when the incoming low-temperature outdoor air is heated and then dumped outside through the ventilation system.

A system that is often used in industrial plants employs tapered ducts along two sides of a tank and also a collecting box or chamber across one end. It can, and does, do a good job. Yet compared to push-pull operation, especially where large tanks are involved, conventional exhaust may be likened to obsolete gas lighting.

There was a time when noxious and toxic fumes from heated tanks were allowed to find their way out of plant areas as best they could; there was no mechanical exhaust and workers were affected. Hoods with gravity type stacks came later, but fumes still billowed around the workmen and at best the fumes were simply more dilute than before.

In the meantime, someone had noticed that tanks near an overhead hood but not under it were affected beneficially. Vapors tended to flow across the tank to the hood. When power-operated fans became common, this effect was even more evident. A development resulting from this phenomenon was a slotted exhaust duct. This, probably, occurred a short time after overhead hoods with slotted rims were developed. A further improvement on this idea, found two slotted ducts, one on each side of the tank, Fig. 2.

Consequently, slotted duct systems became very common. In some communities they were legally required, especially for chrome tanks. There also arose some misconception about the use of exhaust slots for effective fume control. There was a tendency to reason that a certain size of slot did a better job when the air velocity was increased. The fact that the increased air volume affected the process was not so evident. Then someone tried running the slot velocity a good bit higher through a very narrow slot thus reducing the air volume. The results were worse, not better.

It is known that in the case of constant volume moving across any one tank equal effectiveness is realized with either low or high velocity. It is not the slot velocity that is critical but the rate of air movement at the far edge of the tank across from the slot. The velocity at the farthest area away from the inlet slot is known as the control velocity. Obviously, it must be sufficient so that fumes and vapors in this region will not escape. The fundamental and central consideration in every tank exhaust system must be given to the control velocity.

Consider, if you will, a square frame made out of wire and enclosing an area of 1 sq ft. If this frame is placed on the edge of a tank opposite the exhaust opening, room air will pass through the frame on its way to the exhaust slot. If 100 cu ft of air pass through the frame in 1 min, we shall have what is known as a "100-ft control velocity." At the same time air comes in from the top of the tank and also from behind the slotted exhaust duct. Hence, it is evident that in order to obtain a control velocity of 100 fpm, it is necessary to pull a great deal of air from places other than across the tank.

When there are exhaust ducts on both sides of the tank, air rushes in from the center of the tank and also from behind each of the two ducts. The amount of air which must be handled through one or two slots to obtain a specific control velocity can be gotten from test data and can be calculated. This, however, is of no concern to us in push-pull ventilation.

Supplies Jet Velocity

How then does a push-pull system differ from conventional exhaust? We still need the control velocity at the side of the tank farthest from the exhaust opening. We get this by blowing a stream of air from a slot toward the exhaust side. Instead of a 100 or 150 fpm control velocity, the usual maximum with conventional exhaust, we easily get 1000 or 1500 fpm at the jet opening. The air is thrown in a narrow band or sheet.

The velocity in a supply stream, however, does not fall off rapidly because the air follows a well defined path. For instance, a round jet of air will travel in an expanding path with an included angle of about 19 deg. A long narrow jet will expand to include an angle of about 10 deg.

In some of my designs, the air stream arrives at the exhaust opening with a maximum residual velocity of about 46 per cent of the maximum initial velocity. The average velocity of the arriving stream is about 0.3 to 0.4 times the latter figure; the average arriving velocity is 200 to 300 fpm.

Depending on the ratio of the jet opening size to the distance across the tank, we get certain proportions of entrained air flow. The air entrained from the room, and the fumes from the tank mix with the primary jet stream, and the full mass then travels to the exhaust opening. Fig. 3. The ratio of entrained air volume to the primary air jet volume can be calculated from experimental data. Air flow along the length of the tank must be uniform in quantity and velocity. It should also travel at right angles to

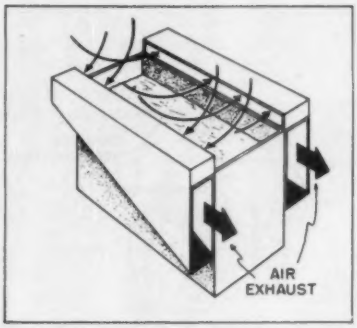


Fig. 2. Slotted duct ventilation idea

the face of the opening and parallel to the solution surface. In addition, the air stream should not strike the solution surface. If it does, the contact should be no more than slight at the farthest part of the "throw."

What are the objectives in designing a push-pull system? Of course, the most important is positive control of fumes and vapors. They must be pushed down to the solution surface and carried across the tank to an adequate opening. Their removal naturally includes the exhausting of supply and entrained air.

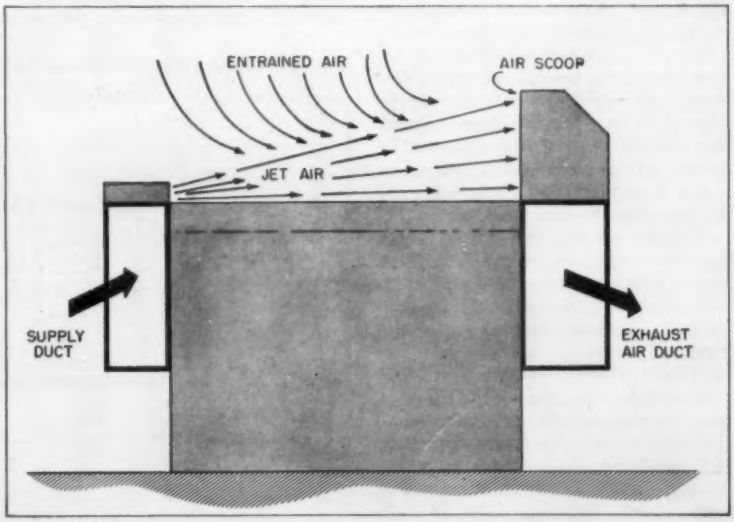
It might be well to mention that in seeking to attain the first objective it may be necessary to give consideration to drafty conditions. If a cross draft with a velocity of, say, 50 fpm is encountered with a conventionally exhausted tank, the air volume to be exhausted must be raised proportionally. If this is not done, the fumes escape from the most remote areas. On the other hand, with push-pull ventilation, the initial velocity at the supply side is far higher than the control velocity of a conventional system. Consequently, there is a relative immunity to ordinary drafts.

Another major objective in any system of tank ventilation is fume control with a minimum of exhaust air. It is obviously desirable to avoid heating of unnecessary volumes of make-up air in winter. Also, for reasons of space and dollar economy, sizes of exhaust manifolds as well as piping and equipment should be held down. This is particularly important when such materials as stainless steel, polyester and fiber glass, and polyvinyl chloride plastic are used. Even though a push-pull system will permit savings of at least 40 per cent in terms of conventional exhaust volume, an added advantage is the saving of materials when alloys or plastics are used.

A saving of 40 per cent exhaust air volume is based on the common exhaust rate of 150 cfm per sq ft. for many solutions. This volume is specified in one of the state ventilation codes for relatively narrow tanks. When 200 cfm per sq ft. of solution surface are required for control, the minimum saving is 55 per cent as compared to the exhaust volume using a conventional system. This is for a design using all inside room air for the supply jet. A a rule, in a push-pull system outside air is supplied for winter operation. In such a case, minimum saving in heated air is 70 per cent. Such a saving of room air also means a reduction in the heat load. In addition to this, we get adequate fume control.

With conventional exhaust systems, there is a low compromise exhaust rate that is used in order to avoid excessive negative pressure in the plant. Push-pull systems with low exhaust rates

Fig. 3. Jet opening, distance across the tank affect amount of air entrainment



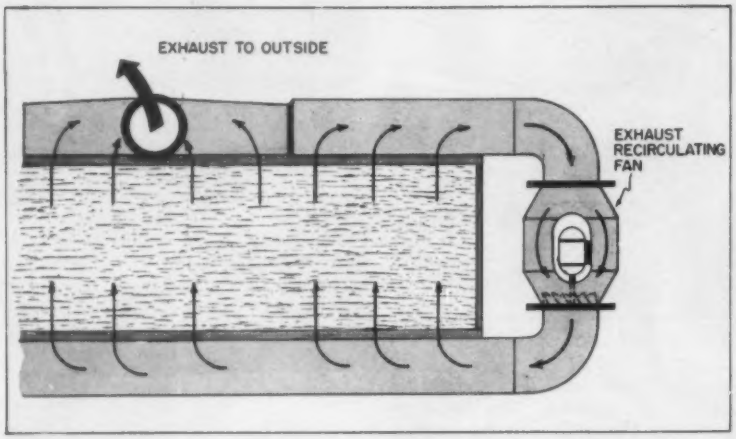


Fig. 4. Supply, recirculation is handled by one fan, exhaust unit not shown

allow the opening of doors with ease in the winter time. Besides, the exhaust rate does not fall off as with winter operation of most shops with conventional exhaust.

There are, in certain cases, other methods of push-pull which produce similar results to those obtained with outside air supply. Systems in Fig. 4 and Fig. 5, each have the advantage of small exhaust fans but in this design the supply fan must also handle fume laden air. This type of system is most advantageous when the solution in the tank is relatively non-corrosive such as hot rinse, mild cyanides or hot water sealers. The system in Fig. 6 has the advantage of requiring only one fan, but total pressure must be higher than for the other systems. The arrangement in Fig. 7 is excellent for use when the tank has a non-corrosive solution. With tank "B" containing a corrosive solution, the exhaust volume is kept low; the "B" fan is a small and inexpensive unit. Consequently, the net air loss from the room is reduced for the two tanks combined.

Now that some of the design objectives for tank ventilation have been discussed, and the advantages of the push-pull system have been related, the limitations of this system will be given attention. When a long and wide sheet of metal is suspended for a time over a tank and across the supply air stream, there is bound to be some difficulty. This condition exists when a sheet is drawn from a solution, particularly one that has been heated. The supply stream is naturally expected to flatten all rising fumes and the solid sheet wall blocks it. But, surprisingly, this is not a difficulty in practice because the time interval is relatively short. In one actual case, this condition of obstruction occurred during the anodizing process of aluminum sheets that were 5 by 20 ft in size. However, any fumes that escaped soon returned to the exhaust system and passed outside.

Sometimes shallow-dished pieces are racked for chrome plating with concave surfaces facing the supply stream. If the usual supply velocity is maintained, rebound can occur. This is a definite limitation for toxic solutions, but it has been countered with decreased jet air velocity, using the same volume and larger jet openings. The exhaust flow is then able to prevent rebound and the oncoming supply air helps to push the fumes on their way. Flat obstructions do not seem to produce any rebound provided that the stream is not stopped completely.

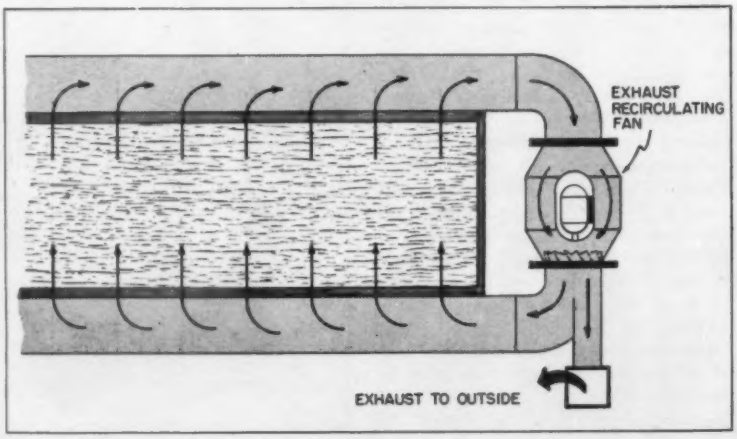
There is another limitation that also could be termed an annoyance. The exhaust side must have a scoop to stop the supply air stream and direct it into the exhaust slot. For instance, the scoop for a tank five ft wide must be 12 in. above the tank. The scoop height, in some cases, cannot be tolerated. For narrower tanks the scoop is lowered since they are usually the ones requiring continual access over the edge by the workmen. The high scoops accompany the wide tanks which are nearly always served by monorail.

Still another limitation for push-pull occurs when tanks have extremely low solution levels, 24 to 36 in. below the edge of the tank, for example. With such a condition, violent turbulence and rolling of fumes is produced and there is increased entrainment of room air. The velocity of supply air and also the quantity must be reduced while the exhaust volume is increased. For solution levels below 6 in., the design exhaust volume must go up as the level goes down. At the same time the supply volume and velocity must be somewhat reduced.

At this stage, I should like to bring up the fact that conventional exhaust itself is seriously limited wherever the tank is extremely wide. On the other hand, to give you an example of what a push-pull system will do, I should like to consider one with which I am familiar. This had to do with an acid tank whose dimensions were 10 ft in length by 45 ft in width. These dimensions are so mentioned because the supply air had to be blown 45 ft from a jet which was 20 in. high and 10 ft long. The velocity of the jet was about 1500 fpm. This arrangement worked. In general, the limitations of push-pull systems are few, and in most cases are amenable to modified design. As a rule, the small manifolds which are required can be installed if a modified system is possible. Of course, if only one duct can be squeezed in, the only possibility is conventional one-sided exhaust.

So far, generalities in comparing push-pull with conventional exhaust have been discussed. Perhaps a bit more attention should be given con-

Fig. 5. Design calls for a fan to do double duty of recirculation and exhaust



ventional systems and consequently, calculations pertaining to conventional exhaust systems will be taken up. The various solutions used in cleaning and plating are classified as class I, II, and III. Class I solutions are either toxic or corrosive or both; they are usually hot. Class II solutions may be hot but not corrosive or toxic. If they are corrosive or toxic, then they must be relatively cool to stay in this particular class. Class III solutions are not hot or corrosive or toxic. They are usually harmless solutions having bad odors.

Control Velocities

The reason for classifying a solution is to determine what control velocity is required. Class I solutions require a maximum rate of 100 fpm; class II calls for 100 fpm; and class III requires 75 fpm or less. Control velocities, of course, are all based on still room air. If cross draft exists, corrections must be made to attain these.

It might be well to mention that it is not always a simple matter to determine the air exhaust for various size tanks to obtain the above control velocity for each class of solution. A 2-sided conventional exhaust system for instance may be free standing or it may have one side baffled. It may have one side against a wall which has the same effect as a baffle. If one side is baffled, the air volume (not velocity through the slot) is reduced for any selected control velocity. Similarly, a tank with an exhaust manifold on one side only may have a baffle or it may be standing free. Hence, the volume requirements will change accordingly. The formula for volume, however, differs for both two-sided systems and for both one-sided systems.

In the following formulas the letter V represents control velocity and Q represents cfm per sq ft of tank surface. The various formulas for different arrangements are as follows:

One side exhaust, baffled:

$$Q = 1.9 \times (W/L)^{0.3} \times V$$

One side exhaust, not baffled:

$$Q = 2.3 \times (W/L)^{0.15} \times V$$

Two side exhaust, baffled:

$$Q = 1.79 \times (W/L)^{0.225} \times V$$

Two side exhaust, not baffled:

$$Q = 2.08 \times (W/L)^{0.15} \times V$$

Therefore, in each case the total exhaust for a tank is cfm = W × L × Q. The distance across the entire tank is denoted by the letter W, and L is the other tank surface dimension. L may be much smaller than W, although that condition should be avoided, if possible. The following table gives some idea of values of Q when the control velocity is 100. The values to the right of the column for W/L figures are the various volumes in cfm per sq ft of surface calculated according to the preceding formulas.

For push-pull system design, the value of Q with increasing W/L is estimate the minimum air volume which can be saved with push-pull.

The air saving in winter naturally represents a reduction in fuel cost. It is hoped that a discussion of some basic economics helps to bear this point out. To begin with, the following facts are presented and, of course, some assumptions are made as to the temperature and cost of fuel.

A cubic foot of standard air weighs 0.075 lb; one pound of standard air will absorb 0.24 Btu of heat when its temperature is raised one degree F. If we assume that one cfm is the rate of air intake, or 60 cu ft per hr, then the weight per hour equals 4.5 (60 × 0.075). If each pound of air is raised one deg F., it will absorb 0.24 Btu. Thus in one hour the heat required is: Btu per hr per cfm per deg rise = 4.5 × 0.24 = 1.08.

As an example, a certain geographic area has been considered where the average temperature for the six coldest months is plus 40 F. Also, the

Table I. These values of Q pertain to systems that handle class II solutions

W/L	One Side Baffled	One Side Not Baffled	Two Sides Baffled	Two Sides Not Baffled
0.25	126	196	131	178
0.50	154	210	153	191
0.75	175	220	168	205
1.00	190	230	179	209

89, 90, 92, and 94. I use the amounts for class I solutions as well as class II. Then the constant supply is 45 cfm per sq ft. With the use of outside air, it is evident that the net loss from the building is at the most, 49 cfm (94-45) per sq ft of tank surface. No matter which type of conventional exhaust one uses, the push-pull losses are much lower. It is possible then to

temperature of the plant area from which air is drawn has been considered to be maintained at 70 deg. F. Thus, it is evident that the make-up air must be heated by some means or other through 30 deg F. (70 deg — 40 deg) The heat per hour on the average will then be in Btu per hr as follows: 1.08 × 30 = 32.4 Btu per hr.

A further assumption has been made that the plant has boilers operating at 70 per cent efficiency. Let the heat content of one gallon of No. 5 fuel oil be 154,000 Btu. Then the boiler will deliver 107,800 Btu (0.7 × 154,000) to the area for every gallon of oil burned, less the transmission losses. Since we now know that 32.4 Btu per hr are required to heat make-up air at a 1 cfm rate, we can now determine the minimum number of gallons of fuel oil required to heat your rate of ventilation air in cfm.

The formula for this total is as follows: Gallons of oil per hr (total) = (32.4 × cfm) ÷ 107,800 = 0.0003 × cfm. If the delivered price of No. 5 oil is $0.083/ gal, the cost will then be: 0.0003 × cfm × 0.083 = $0.0000249 × cfm. Hence, at a rate of 1,000 cfm it will be $0.0249 per hr. For a one

(Continued on page 196)

Fig. 6. This is another way equipment can be arranged to work advantageously

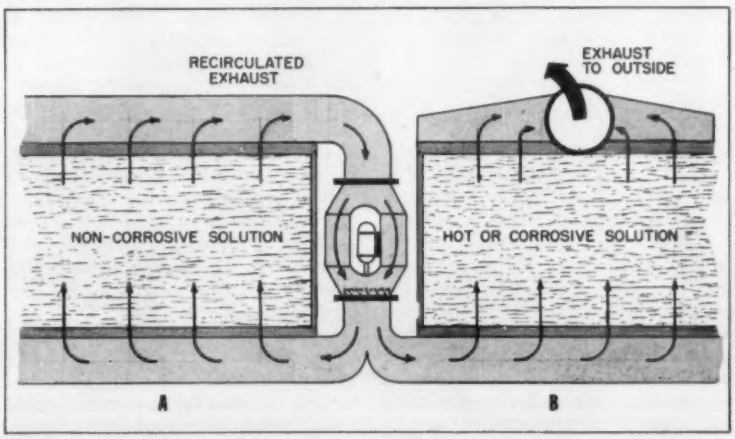


Fig. 1. A report is secured from every engineer once an hour. The report is simply a few words describing his activity at that moment. Shown here is one of the authors, A. J. Agett, at time of observation

Corning Engineers Check on Selves

Work Sampling Shows up Poor Procedures, Wasted Time

By A. J. AGETT, JR., and W. D. WALKER, Industrial Engineering, Corning Glass Works

HERE'S a new twist on how an industrial engineering department decided to apply its principles to its own operations (instead of some other department in the company) to control and reduce operating costs. An experiment with Work Sampling, made by the General Industrial Engineering Department of Corning Glass Works, has shown a way to accurately measure and improve office operations with very little time and effort.

In the belief that industrial engineers should apply cost reduction in their own bailiwick, continuous studies were made of the departmental workload. For this purpose, each engineer kept an account of just how much time he spent on each phase of his activity each day. In addition, records were maintained of the units of work accomplished such as the number of Position Descriptions, Job Evaluations, Incentive Rates, etc., that had been completed. These reports were summarized weekly and yearly by individual and for the department as a whole.

Total time reported for a given function and the average time required per unit of work, obtained simply by dividing the total time by the number of completed units, gave a valuable indication of any areas that needed special cost reduction efforts.

For example, it was found that reissuing organization charts consumed over 300 engineering man-hours per year plus the services of a draftsman and clerical help from other departments. Although the methods employed had been reviewed and improved upon several times previously, another study was made of the procedure.

The charts were rough drafted by the organization planning engineers to secure a layout that gave the user the maximum benefit and to achieve a well-balanced appearance. In addition to the position titles and lines of responsibility, the charts carried the names of the position incumbents and the authorized force for each position. The rough layout was redrafted by a draftsman on a Multilith master sheet.

Final step in the preparation of the Multilith master was the typing job done by a Verityper so small print could be used. Needless to say, this master required delicate handling and any significant error required a complete redrafting and retyping job.

In the improved procedure, developed as a result of the study, adhesive-backed Chart-Pak layout materials were used on a layout board by an

office clerk to layout the charts. Names, titles, and other pertinent information were typed on the individual position blocks. A reduced size Multilith master was made directly from the layout by means of the Xerographic process.

With the new method, which required only 2½ engineering man-hours last year, revisions to the charts were made simply by typing and exchanging position blocks and by moving tapes on the layout board. The office clerk could handle virtually all of the work involved in revising and reissuing organization charts.

Simplification Saves

Another saving of 350 engineering man-hours per year was realized through the simplification of the procedure for reviewing the Wage and Hour Law status of Corning Glass Works employees.

Coupled with the savings from a number of similar improvements, this has enabled a reduction in the engineering group in one section of our department from 4 to 2 men—a 50 per cent savings in force. These men have been freed for other engineering work in the company.

In addition to providing for an objective review of past performance the data also gave a sound basis for predicting future workloads and future manpower requirements.

After some research into the Work Sampling Technique, it was decided that it might be used to simplify the time reporting procedure. A 10-week trial period, during which both the Work Sampling technique and the daily time reports were used, demonstrated that random observations not only could eliminate the tedium of the daily time reports, but also actually could do a bigger job more accurately and in greater detail.

The study was set up as follows:

1. The overall objectives and elemental breakdown were determined.

Essentially the objectives and the work's elemental breakdown were the same as previously, except that it was decided to include a breakdown of the locations (plant, department, etc.) for which the work was performed.

2. The number of observations per day were computed.

The statistical formula for computing the number of observations that will be required for a given elemental percentage and a given confidence level is:

$$O^1 = \sqrt{\frac{P(1-P)}{N}}$$

where: O^1 = the standard error of a percentage; P = the elemental percentage expressed as a decimal; N = the total number of observations upon which "P" is based.

When one O^1 is used, the probability is that in 67 out of 100 cases the percentage falls within the range of the standard error. For the office study, two O^1, which increases this probability to 95 out of 100, was used.

It was decided that while a close accuracy tolerance would be required on a yearly basis, fairly wide tolerances of accuracy would be permissible on a monthly basis. Using the standard error formula expressed above, it was found that eight observations per day per man, which totals over 1900 observations in a year, would give the desired accuracy. With 1900 observations and using two O^1 the chances are 95 out of 100 that a 20 per cent element will be accurate to ± 1.8 per cent and a 10 per cent element accurate to ± 1.4 per cent.

3. An observation form was prepared:

Since the department consists of five sections, each of which performs different functions, it was necessary to develop five different elemental breakdowns and of course, five forms, one for each.

Figure 3, illustrating the form used for the Organization Planning and Position Evaluation Section, shows a typical observation sheet. The elemental breakdown is shown across the top of the page. The space for each element is subdivided to provide a column for each engineer, identified in this case as A., T., & O.

Locations for which the work is performed are listed down the left hand side of the sheet. This refinement, which would have been impractical under the old system of time reporting provides further assistance in studying the nature of the departmental workload.

4. The observation times were determined.

Placing the consecutive hours of the office day in front of the numbers from a two-place table of random numbers gave the observations times. For instance, the first number in the table was 43 and the first hour of the day that observations were to be made was 8 a.m.

Thus, the random time for the first observation would be 8:43 a.m. Numbers over 59, of course, were skipped. The time table was developed for 31 days of observations and is used over again each month since the dates of

Fig. 2. Most satisfactory technique discovered for making random observations was to provide secretary with timer which signaled by turning off desk lamp

successive months (except March) fall on different weekdays.

5. The random observations were made.

Two techniques were tried. The most satisfactory was to provide the secretary with a timer which turned off her desk lamp when it was time for an observation. She then secured from each engineer, in just a few words, a report of his activity at that moment and the location for which the work was being performed.

No real interruption or disturbance was experienced since everyone quickly adjusted to the technique and the mere presence of the girl with the observation sheet was sufficient to procure a report. The girl was provided with the random times and reset the timer after each observation trip.

Observation Method

Sometimes an engineer was out of the office when an observation was made. When this happened, the girl left a reminder on his desk of the times missed. If he could remember fairly well he reported what his activity was at the observation time; otherwise, it went as a missed observation and nothing was recorded. With this technique, very few observations were missed.

In the other method tried, a timer with a bell was used and the engineers made their own recordings when the bell rang. At first this worked quite well but after a while there was a tendency by the engineers to forget to make recordings.

The only records now required from each engineer in conjunction with the Work Sampling study are of the total hours worked and the units of work completed.

The 10 weeks trial study showed a close overall correlation between the actual hours reported by the engineers and the observations made at random intervals. In several areas, where it was felt that the time reports were inaccurate, the Work Sampling study indicated the nature of the error. There were also several instances of short, irregular or unusual jobs that were not reported in the time report but which were included in the random observations.

	FORCE CHANGE			EVALU-ATION			POS. DESCRIP.			WAGE & HOUR LAW			ORG. PLAN.			MISC.			TOTALS		
	A	T	O	A	T	O	A	T	O	A	T	O	A	T	O	A	T	O	A	T	O
PRESIDENT	4	4	4	5	5	4	5	5	2				5	5	5		4		23	25	18
TREASURER	4	4	2																4	3	2
IND RELS	5	5	4		3			2		3			4	5			5		12	23	9
ALBION		2	3			3			5	3									0	5	16
PUBLIC REL										3				3					3	3	0
SALES			5			5					3				5		3	5	0	6	44
ENG'G	5	5		5			5					5	5			4			33	6	6
GLASS CENTER	1	1					1						5		3				15	1	3
RESEARCH	5	4				3			5							5			18	4	3
TOTALS	28	26	18	20	21	24	16	14	17	6	6	6	24	21	28	10	12	12	164	101	101

Fig. 3. Typical observation recording form used for the Engineering office study

The figures below are totals of the reports for several engineers on whom observations were made during the 10 week trial period. The comparison of their activity as measured by the actual hours reported and by random observations is given in Table I just below.

The accuracy limits of the percentages developed by the random observations were computed with the standard error formula,

$$O^1 = \sqrt{\frac{P(1-P).}{N}}$$

We found two O^1 (or in 95 cases out of 100), with 720 observations a 20 per cent element would be accurate to ± 3 per cent and a 10 per cent element would be accurate to ± 2.2 per cent. As the earlier computation based on 1900 observations indicates, extending the study to secure more observations will reduce the standard error of the percentage considerably.

Conclusion: Time and Work Reports in the Industrial Engineering office have enabled sizable manpower savings by identifying areas in need of special cost reduction efforts. They formed the basis for more accurate estimates of future activity levels, predicting manpower requirements, and budget preparation.

Work Sampling has provided an easier and more accurate means of time reporting. Since the original trial, the technique has been successfully extended to the office clerks. Also a few high level CGW executives are using Work Sampling as a means of self analysis and self improvement. The experience indicates that work sampling can be used in a variety of office situations. We wish to acknowledge the assistance of Professor Robert L. Morrow, who encouraged and reviewed the preparation of this article.

Table I—Comparisons of engineers' activities as observed during trial period

Activity (Work Element)	Total Hours Reported	Total Random Observations	Per Cent of Time by Time Report	Per Cent of Time by Work Sampling
*Original Planning	117.25	135	12	19
*Force Changes	250.75	142	26	20
Position Description	124.50	93	13	13
Position Evaluations	195.25	132	20	18
Wage & Hour Law	61.00	39	6	5
Wage & Salary Administration	184.50	109	19	15
Miscellaneous	35.00	71	4	10
TOTAL	968.25	720	100	100

*Organization Planning and Force Changes were recognized to have been reported inaccurately on the time report since there is a great deal of overlapping in the two activities. Note that combining the hours reported and the observations for these two elements gives a comparison of 38 per cent of the hours against 39 per cent of the observations.

Okolite-Okoprene 15kv and 5kv cable installed in the Moloney Electric Company's new testing laboratory. The fabricating plant is also wired with Okolite-Okoprene. Gamp Electric Company, St. Louis, Missouri, made the electrical installation.

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Available with either copper or aluminum conductors

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Steel Dome, Plastic Coating Make New Field House an Unusual One

USING A UNIQUE steel dome, the University of Wichita solved the behind-the-post seating problem in its new field house, and licked the maintenance problem on nearly 30,000 sq ft of exterior steel wall paneling by applying a sprayed-on plastic coating based on Bakelite vinyl resins.

The $1,500,000 structure is one of the largest completely round buildings in the country, measuring 268 ft in diameter, and boasts unobstructed visibility from every one of the 10,235 seats in the house.

The dome, a lamella type, is fabricated of steel and rests on a massive steel tension ring that encircles the dome at its base. The stadium section of the building is circled by a 22-ft wide concourse which leads to the entrances and exits. Also enclosed in this unusual building are 40 rooms—classrooms, dressing rooms, shower rooms, concession stalls and athletic department offices.

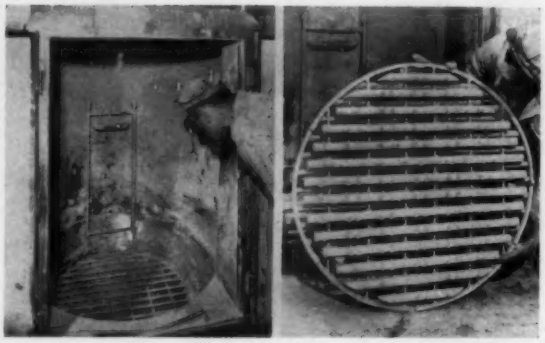
The special plastic coating covers the 23-ft high, vertically corrugated steel panels which form the exterior with a tough, seamless membrane. It is expected to eliminate the need for repainting for a minimum of eight years, and is impervious to moisture and industrial acids.

Permanent Magnetic Grates Protect Pulverizers from Tramp Iron

IN THE MANUFACTURE of vat dyes, the Toms River-Cincinnati Chemical Corp. is employing a highly concentrated form of magnetism to safeguard their precision machinery from tramp iron damage. Substantial production gains have been noted since installation of permanent magnetic separators which protect their high speed pulverizing equipment.

Several Micro-pulverizers are used for grinding dyes and intermediates. The accidental and often undetectable presence of nuts, bolts, nails, wire and fine iron particles from the barrels of materials used was causing frequent damage, repairs and replacement of the screens in the pulverizers.

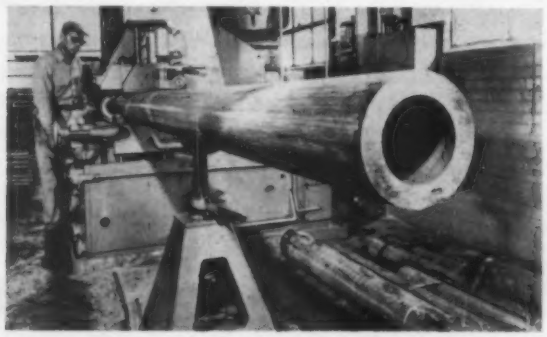
To remedy the situation, circular magnetic grates, 30 in. in diameter, were installed in the charging hoppers of the pulverizers. According to maintenance supervisors at the plant, the grates have been completely effective, and screen replacement has become a rare occurrence.



These magnetic separators of the grid type were developed by Eriez Manufacturing Co., Erie, Pa., to remove iron contamination from free flowing materials. The grates are composed of a series of magnetic tubes powered by elements of Alnico V. Protected by a steel grill, which also disperses the material stream evenly through the grate, the tubes generate a network of magnetic fields.

Continuous Casting Machines Produce Bronzes in Diameters to Nine Inches

CONTINUOUS CAST BEARING BRONZE is now available in larger stock sizes than ever before, ranging from 5 in. to 9 in. in diameter in many foundry alloys and a variety of shapes up to 105 in. long, following foundry technology developments at the Barber, N. J. plant of American Smelting and Refining Company.



Formerly available only as sand, permanent mold or centrifugal castings, in stock lengths of 12 in. or 13 in., bronzes were first produced continuously by the patented Asarco process in sizes ranging from 7/16 in. to 5 in. in diameter. Equipment capable of casting much larger diameter rods and tubes, ranging from 5 in. to 9 in. in diameter is now in operation.

In the process, molten bronze flows continuously into water-cooled dies, freezes, and emerges cast to size in the form of finished mill lengths as long as 16 ft and in diameters ranging from 7/16 in. to 9 in., with shapes varying from true round to more complex, ready to use "as cast".

Asarco's gravity-fed bottom-flow casting method insures dirt- and dross-free castings, and sand inclusions are entirely impossible. Foreign matter floats on top of the melt without turbulence to carry it along with the product.

Five four-story high vertical production lines, operating continuously, create an uninterrupted flow of material. Molten metal is fed into the casting machines from batch melts made in arc furnaces, through casting furnaces with crucibles large enough to serve as surge or storage tanks.

A
B
C
D
E
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B Cut number of wheel dressings in half, increasing wheel life.
C Completely eliminate hundreds of man-hours per annum on sump cleaning and sump pump maintenance.
D Boost efficiency of grinder, increasing machine output.
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NEW PLANT CONSTRUCTION — advance information on location, costs

Brewton, Ala. — Container Corp. of America, 28 South Dearborn St., Chicago 3, Ill., has plans under way for the construction of a new bleached sulphate pulp and board mill. The mill will have a capacity of 300 tons of board daily and will supply a large part of the company's requirements for bleached pulp board. Work will get under way soon with completion scheduled for late 1957. Plant and equipment will represent a $30 million investment.

Holt, Ala.—The Central Foundry Co., Pacific Street, Newark, N. J., manufacturers of cast iron soil pipe and fittings, has announced plans for the expansion of company foundry and plant facilities here for increased output. Work will get under way soon for completion in 1956 at a reported cost in excess of $2 million.

Los Angeles, Calif.—B. F. Goodrich Co., 448 South Main St., Akron, O., has announced an expansion program to increase tire output of its Los Angeles plant by 50 per cent. Expansion plans include two new buildings, a new tire building and curing equipment, slated to be completed and in operation by June 1956. New addition to be erected at a cost of $6 million.

Savannah, Ga.—The Hercules Powder Co., Inc., 917 Market St., Wilmington, Del., has approved plans for a major expansion of company's plant facilities for the manufacture of rosin and rosin size, including a new unit for the processing of crude tall oil. Cost of expansion, to be completed in 1956, will cost about $4.5 million.

Decatur, Ill.—Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pittsburgh, Pa., has plans under way for the construction of a new multi-million dollar window glass plant on an 80 acre site. Ground will be broken early in 1956 and the plant is expected to be in operation within one year.

Granite City, Ill.—The Granite City Steel Co., steel sheets and tin plates, has recently announced plans to increase company's ingot capacity by 30 per cent by early 1958 from present rated capacity of 1,080,000 tons per year. Expansion program will include new blast furnace. It will replace the smaller of two present blast furnaces and have twice its pig iron capacity.

Gramercy, La.—Kaiser Aluminum & Chemical Co., will soon begin construction of a new aluminum (bauxite refinery) plant on local site here, about 30 miles north of New Orleans. Ground for the new plant will be broken in the spring of 1956 and is scheduled for production in July of 1957. Kaiser's ingot capacity on completion of this and Ravenswood, W. Va., project will total 1308 million pounds. Plant will represent an investment of $60 million.

Marrero, La. — The Johns-Manville Corp., 22 East 40th Street, New York 16, N. Y., has recently announced plans for the construction of a new floor tile plant with an annual capacity of 35 million sq ft of asphalt and vinyl asbestos tile. The new plant will provide 70,000 additional sq ft of floor space and will be completed by mid-1956. This represents a part of company's expansion and improvement program of $25 million planned for 1956.

Paulsboro, N. J.—The Pennsylvania Salt Manufacturing Co., 1335 Chestnut St., Philadelphia, Pa., has work under way on the construction of a new plant, adjoining company's present facilities, for production of new, granular type commercial fertilizers. New plant, designed by company engineering staff, will be completed in 1956.

Somerville, N. J.—The Tube Division of the Radio Corp. of America, 30 Rockefeller Plaza, New York 20, N. Y., has plans under way for the erection of a new 127,000 sq ft plant for the manufacture of transistors and allied devices. Building will be a one-story structure to be completed in the fall of 1956. The Turner Construction Co. has been awarded construction contract. Plant will represent an investment in excess of $1.3 million.

Niagara Falls, N. Y.—E. I. du Pont de Nemours & Co., Electrochemicals Department, has announced plans for the expansion of local plant to increase capacity for production of polyvinyl acetate emulsion. Work is scheduled to begin at once for completion late in 1956 and is reported to represent an investment of $550,000.

Cambridge, Ohio — Radio Corp. of America, 30 Rockefeller Plaza, New York 20, N. Y., has authorized plans for company expansion at local plant site to meet demand for tape recorders and high fidelity instruments. Addition will add more than 210,000 sq ft of floor space to present facilities of 135,000 sq ft. Construction will get under way at once and is scheduled for completion by late 1956. Cost of expansion is expected to exceed $2.5 million.

Columbus, Ohio—Ford Motor Co., Dearborn, Mich., has plans maturing for the construction of a new 1.2 million sq ft auto-truck parts plant near here. Construction is scheduled to start this fall with completion by mid-1957. No estimate of cost announced but reported to be a multi-million dollar project.

Toledo, Ohio—Sun Oil Co., Walnut and Sixteenth Streets, Philadelphia 3, Pa., has authorized plans and work is already under way on the expansion and modernization of refinery facilities, including a new alkylation unit for the production of high octane gasoline. New addition to be completed before January 1957 will represent investment of $1.7 million.

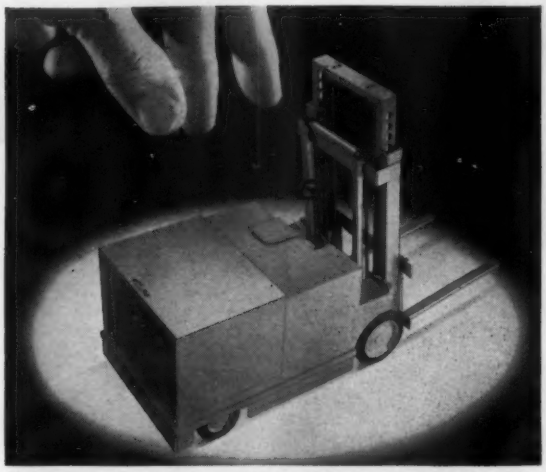
Twinsburg, Ohio—Chrysler Corp., Detroit, Mich., will begin construction of a new fabricating and stamping plant on new site recently selected in place of Macedonia, O. Plant of 1.5 million sq ft of manufacturing area will have 28 lines of stamping presses and 260 machines to turn out rear-quarter decks, doors, deck lids, hoods and fenders for the Chrysler cars. Plant, to be completed in the fall of 1957, is reported to cost in excess of $85 million with equipment.

Suffolk, Va.—The Nestle Co., Inc., 2 Williams Street, White Plains, N. Y., has announced plans for the construction of new plant. Plant will be completed in late 1956 and will cost in excess of $2.5 million with a like expenditure for machinery and equipment.

Winchester, Va.—The United States Flat Glass Corp., a newly formed company, has announced plans for the construction of new glass manufacturing plant to be erected here. Company was formed by a group of independent glass distributors from across the country to produce 70 million sq ft of sheet glass and approximately 25 million sq ft of plate glass annually. Most of planned production will be consumed by members comprising the group with excess to be sold on the open market. Plant is scheduled for completion in early 1957 and will cost approximately $16 million.

Ravenswood, W. Va.—Kaiser Aluminum & Chemical Co., 1924 Broadway, Oakland, Calif., has authorized plans for the construction of a new aluminum reduction plant with a capacity of 220,000 tons annually. Plant will be erected next to company's new $96 million sheet and foil mill now under construction and will increase producing facilities by 50 per cent. Work will get under way in April 1956 for completion by mid-1957. Estimated cost of plant and equipment to exceed $120 million.

Kenosha, Wis.—The Eaton Manufacturing Co., 700 E. 140th St., Cleveland, Ohio, makers of automobile and aircraft parts, will soon begin construction of manufacturing addition to add one-third more space to manufacturing area of its Dynamic Division. Floor area will be increased by about 34,500 sq ft to a total of 133,000. Plant will be completed and in operation by late 1957 and is reported to represent an investment of $1.3 million with equipment.



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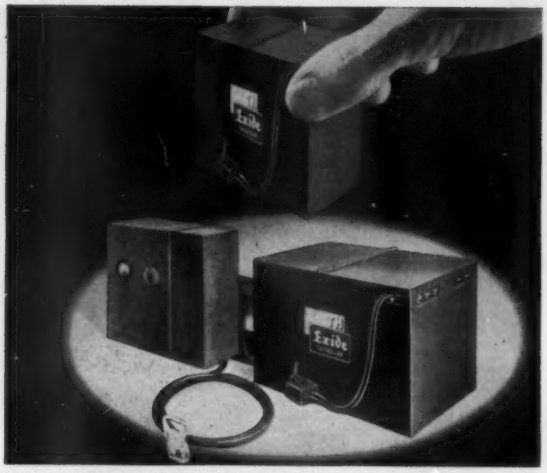

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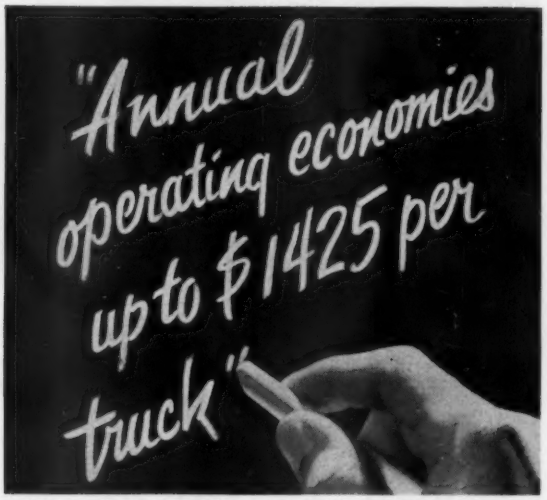

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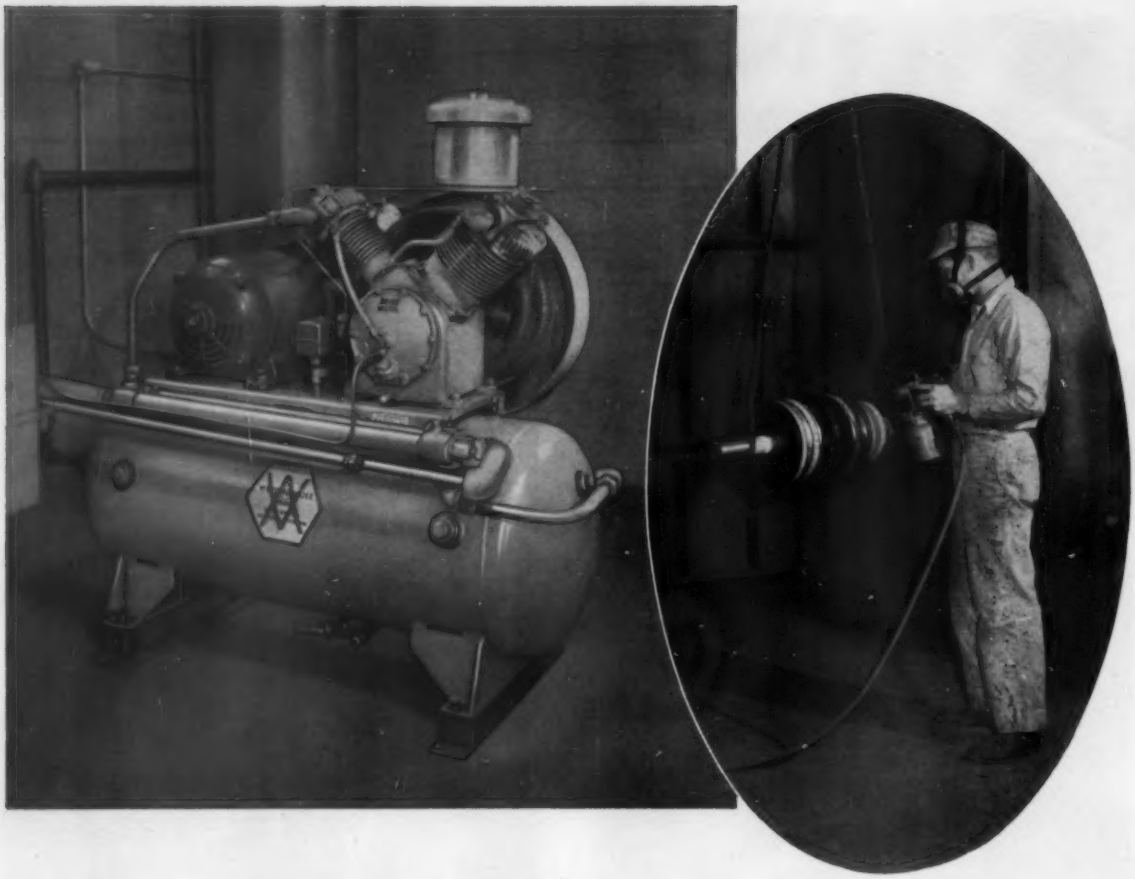

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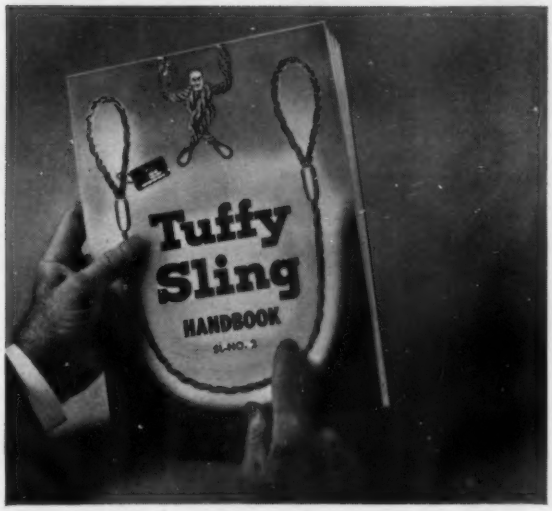
Tuffy® SLING NEWS

Vol. 1 Published Monthly in Leading American Trade Magazines by Union Wire Rope Corp. No. 4

HOW NEW FERRULE WORKS IS SHOWN IN FREE SLING BOOK



Ferrule Story, Facts on Fittings and Slings In Useful New Edition

This new and enlarged edition of the Tuffy Sling Handbook is an absolute "must" for plant and safety engineers, purchasing agents and shop foremen—everyone who uses, buys, or supervises work with slings. We distributed more than 85,000 copies of the first edition, and the demand for this new, completely revised edition is going to be even greater.

Featured in our new Sling Handbook is the new Tuffy streamlined metal ferrule pressed on the tucked eye splice. This new Tuffy Sling Handbook lists nearly a dozen new fittings—sling bridles, slip-on thimbles, safety hooks, sling saddles, horizontal clamps, and many others. It tells you all about the enlarged line of factory-fitted Tuffy Slings. It contains a complete rigger's manual, proof-tested rated working loads and specifications on all Tuffy Slings.

It's Yours Free, but our supply is going fast. So mail the coupon now for your copy of this valuable Tuffy Sling Handbook.

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He can save you the time and trouble of carrying a full inventory. Tell him your normal requirements and he will keep matching stock of Tuffy Slings and Tuffy Hoist lines for fast delivery. Your Tuffy distributor can supply longer sling service life—bigger value for your money.

New Tuffy Ferrule Exclusive Feature at No Extra Cost

Union Wire Rope developed the new Tuffy Sling ferrule to make Tuffy Slings easier, safer, and faster to handle. It took extensive research and proof testing to improve upon the full length hand splicing of Tuffy Sling eyes which have withstood the test of time. Now equal or greater strength is attained with ferrule splice and the hazards of protruding tuck terminals are eliminated. Yet it costs you nothing extra for this exclusive feature.

Strength of Tuffy Fabric Now Equaled in Splice

First, the 9-part machine braided Tuffy Fabric of the sling eye is tuck-spliced together. Then the new Tuffy steel ferrule is slipped around the splice. Under terrific pressure, the metal of the ferrule (see cross section of splice and ferrule above) virtually flows into the interstices of the machine braided fabric. Every Tuffy sling is given strength at the eye splice equal to the superior strength of the machine braided fabric. The swaging of the ferrule at the ends makes them smooth, so they can't injure hands or catch on loads.

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The four Type N ROTO-CLONES shown above are only a few of the total number installed in this large automotive parts manufacturing plant.

ROTO-CLONES Rout Grinding and Buffing Dust

DUST, of course, is a natural by-product of grinding and buffing. But nature isn't allowed to take its destructive course in *this* automotive parts plant—AAF ROTO-CLONE dust control units are on the job, every minute of the working day.

The compact, self-contained Type N ROTO-CLONE exhausts, collects *and stores* dust, in the form of sludge. The high cleaning efficiency of this hydro-static precipitator results from the combined action of centrifugal force and thorough intermixing of water and dust-laden air. Type N's compensating water level assures this high cleaning efficiency over a wide range of exhaust volumes.

Type N ROTO-CLONES are available in exhaust volumes up to 50,000 cfm. For complete product information, call your local AAF representative or write direct for Bulletin 277.

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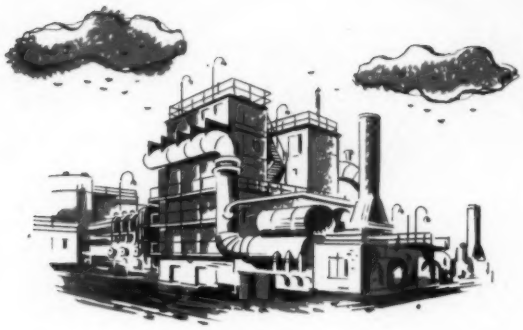
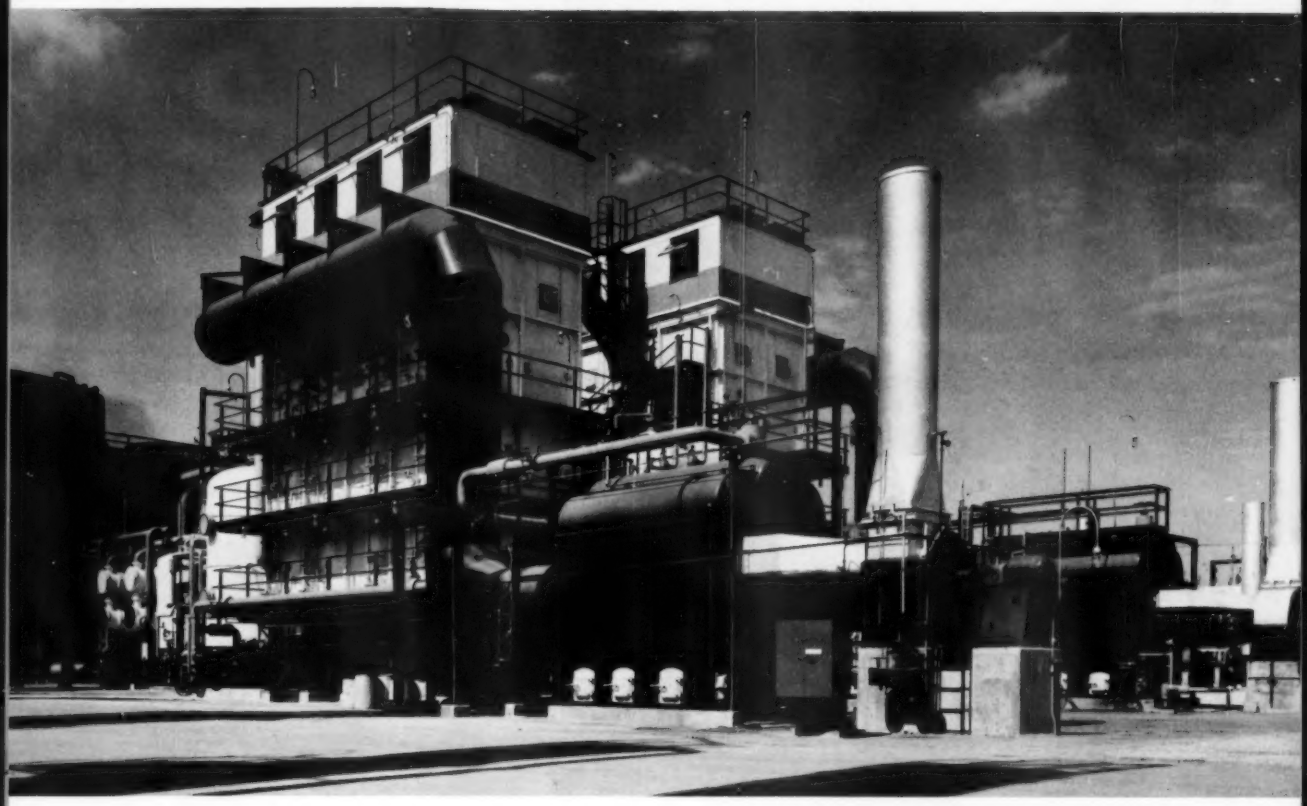


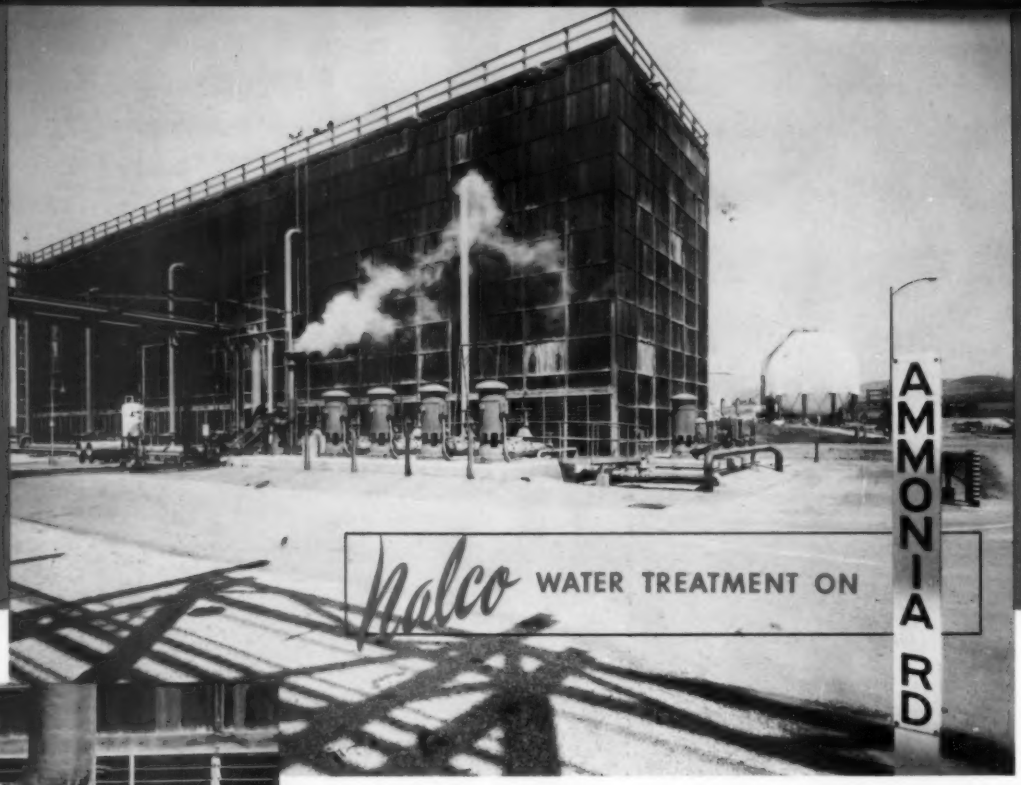
Water treatment by NALCO protects boilers and cooling system of big new ammonia plant

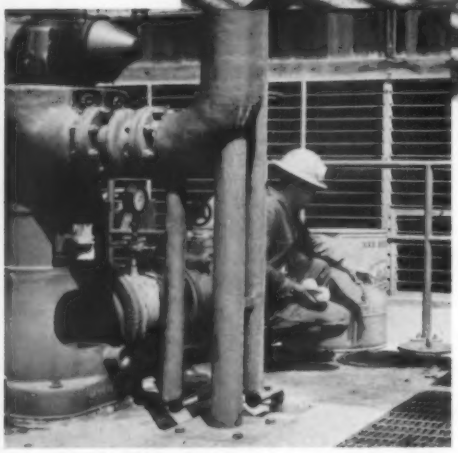


Processing units (left) and Nalco-protected waste heat boilers in new $13 million Brea Chemicals, Inc. ammonia plant.

When $13,000,000 goes into a brand new ammonia plant . . . equipment, services and supplies must be right up to snuff from the start. The Nalco System has been working here from the beginning—and the Nalco treatments and services rendered in a successful plant-wide program point up the advantages to be gained with the Nalco System in plants new or old.

See the next page for details on Nalco results on Ammonia Road.



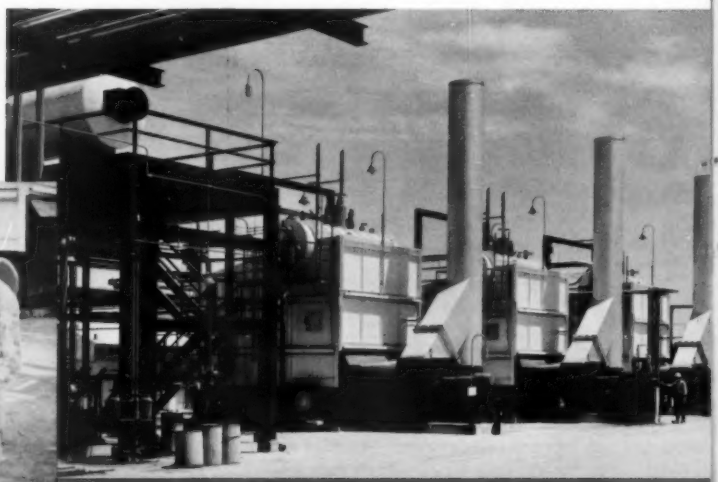


Top—Large cooling tower at this new west coast ammonia plant gets protection against scaling and corrosion with a non-toxic Nalco formula. Low pH treatment stops deterioration of cooling tower lumber and cuts dosage requirements for slime and algae control.

Above—Ball form cooling water treatment is merely dropped into a simple wire basket device suspended in cooling tower basin.

Nalco System treatments on Ammonia Road solve these important water and steam processing problems: scale and corrosion prevention in both water and steam systems; boiler-water foam control and sludge-conditioning; and contamination-free process steam.

Whatever your water treatment problems may be—in a plant of any size—there is a Nalco System program designed to solve them, permanently . . . and economically. Write or phone today for details.



Above—Three steam generators on outdoor settings provide super-pure steam for ammonia processing and heating. Nalco chemicals in ball-briquet form are put into by-pass feeders *(left)* to insure trouble-free water treatment on Ammonia Road.

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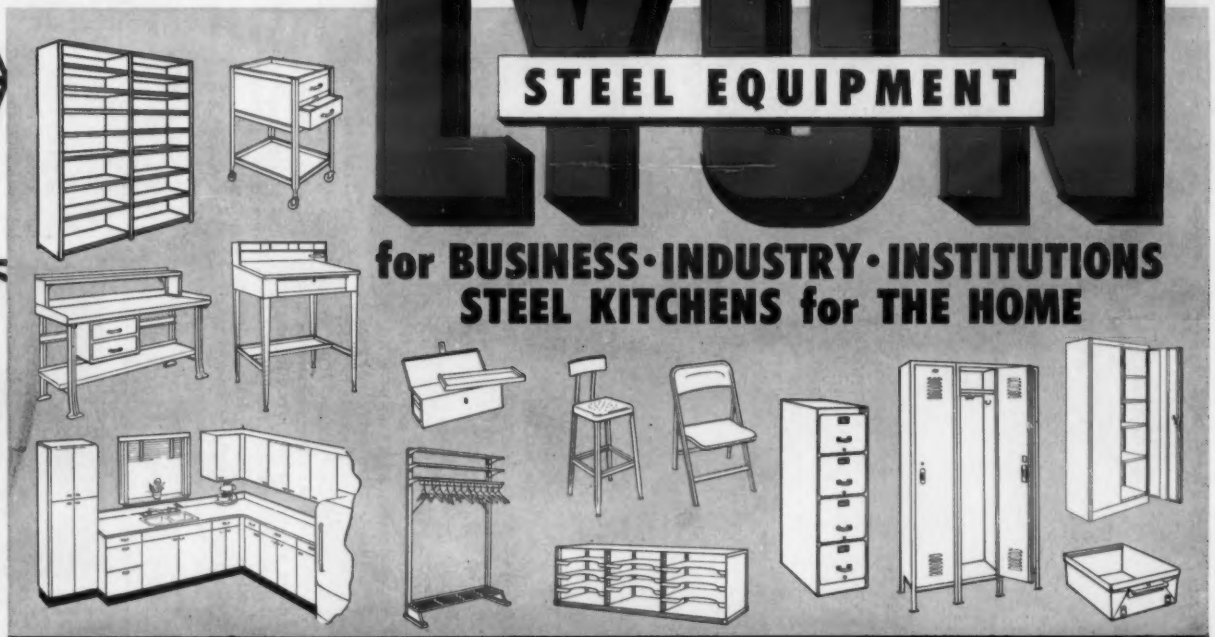

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NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

Use the Reader Service Cards provided on pages 201-202 to ask for more information on these products. Circle item numbers of products in which you are interested.

1—FLASHLIGHT takes many battery chargings

The Multi-Lite's batteries take more than 200 chargings, it is announced — each charge lasting as long as a dry cell. Batteries are not removed from the two cell

light. A lead from the charger, which takes 110 v, plugs into base of batteries and recharges them overnight. Charger handles several flashlights alternately. Batteries are made of nickel cadmium, hermetically sealed against corrosion and reported to last for years. The two cell light is available in chrome case and safety approved fibre case with Neoprene caps, Underwriter Laboratories approved, and priced under $20, including batteries, charger. Gould-National Batteries, Inc.

2—TELEPHONE lets you talk with your hands free

With the Hands-Free Telephone, a plant engineer can carry on a conversation while continuing his work. This phone has a microphone that is sensitive in all directions, says manufacturer, and it can pick up conversation at ordinary voice levels from 20 ft away. Thus, the user can even cross the room to get papers from a file while he talks and listens. He doesn't even have to face the microphone. The microphone (indicated by arrow) weighs only 4 oz and is attached to the telephone instrument by a 12-ft cord. Automatic control is incorporated in the microphone to compensate for voice volume irregularities, to prevent "booming," and to subdue extraneous loud noises. The voice of the party at the other end of the line is amplified and heard through a built-in loudspeaker.

To initiate a call, the user presses an "on" button on the instrument and a signal lamp lights to show that microphone and

loudspeaker are alive. Then the caller dials his number or speaks to the operator, just as with a conventional phone—except that he speaks to the microphone. To receive an incoming call, he presses the "on" button and speaks to the microphone. Pressing the "off" button is equivalent to "hanging up" a conventional phone. The microphone can be disconnected temporarily by pressing a cut-off button. Announced as compatible with any telephone system in the United States, the Hands-Free Telephone can be plugged into any standard 110-v a-c electrical outlet. Stromberg-Carlson Co.

3—WATER HEATER is dual-purpose unit

This storage type gas water heater, the Monel Sanimaster MST 80-80, is designed to provide hot water at two different temperatures from a single tank. The heater is distributed by Crane Co. and by Ruud Mfg. Co. under the names, "Crane-Monel" and "Ruud-Monel." It produces water at 180 F for sanitizing purposes from one outlet, and water at 140 F for general purpose use from the other. The 180 F hot water may be piped to appliances and processes requiring it, while the 140 F water is piped to rest rooms, sinks etc. to eliminate the hazard of scalding. The International Nickel Co., Inc.

4—CHEMICAL COMPOUND melts ice and snow

Ice-Chaser is claimed to clear slippery sidewalks, streets and steps 30 times faster than previously possible. The compound is in the form of small pellets which, when scattered over ice and snow, quickly generate heat and melt through slippery surface. According to company, pellets spread as they melt, thus efficiently removing ice and snow over the whole area. Ice-Chaser leaves no residue, is safe for vegetation, and is non-corrosive, the manufacturer states. It is recommended for use on steps, sidewalks, driveways, streets, parking areas, loading platforms and ramps, railway switches, gutters, downspouts, drains — anyplace where ice and snow are a problem. Ice-Chaser, packaged in moisture-proof polyethylene, is available in bags, drums. Consolidated Paint & Varnish Corp.

5—RETRACTABLE CURTAIN guards against draft

Designed to protect against icy winter drafts every time doors are opened, this retractable curtain, called TransWall, shields doorways during cold weather, yet readily slides out of the way for free use of floor space. Built of a heavily coated fabric, TransWall installs easily on a single overhead track. Nylon rollers permit ready retractability and little space is used when retracted. For example, manufacturer points out that a curtain 20-ft wide retracts to only 2 ft. TransWall is available in custom sizes to suit plant needs. Bemis Bro. Bag Co.

6—CHEMICAL AND PROCESS produce improved concrete

Elastizell, a liquid foaming agent, and a new process combine to permit manufacture of a lightweight concrete described as strong, self-insulating, moisture resistant and widely adaptable. It was developed in West Germany where it has had wide usage in the post war building program. Several outstanding advantages are reported for Elastizell-type concrete: It can be made with readily available materials, like ordinary sand and cement. As floor fill in multi-storied buildings, it affords great savings in weight and handling. As a lightweight roof fill, it is highly insulating, and due to its water repellent nature, it minimizes danger of moisture damage from under side of roofing—also, it can be pumped and worked easily, and does not require as complex roof coatings as many lightweight type concretes. The new concrete is also announced as incombustible and "warm to the touch."

The process utilized enables control of densities over a wide range, company states—from 40 to 150 lb per cu ft, and strengths from 600 to 3000 psi for floor fills and from 300 to 600 psi for roof fills. Low densities—down to 30 lb per cu ft—can be used where strength is not a critical factor, as in insulation. Other suggested uses of the material include insulation for steam pipes laid in the ground, and insulation for walk-in coolers. The material can also be used in the form of pre-cast floor and roof panels.

This plant is safer since they put these Crane valves on hazardous fluids

THE CASE HISTORY—How safely you handle hard-to-hold combustible fluids can depend on the valves you use. Read how a large Midwestern printing and binding plant, by changing to the right valves, encouraged employee care and safety while stopping hazardous leakage and waste.

The plant's supplies of kerosene, naphtha, benzol and similar fluids were stored in a fireproof room. But the danger was in the constant dripping and leakage at the tanks.

The original pump apparatus on the drums was discarded and ordinary valves were installed for drawing supplies. Still the hard-to-hold fluids dripped and leaked—through the valve packing and stuffing box, and at the seats. Fluids were lost . . . the high maintenance costs continued . . . and the unsafe conditions remained.

Changing to Crane No. 130 brass valves on the drum outlets stopped all previous trouble.

To-date they've given more than a year of leak-free, maintenance-free service. These valves have special features for handling light oils, gases and volatile fluids.

Underwriters' Laboratories approved for LP-gases, Crane No. 130 valves have a composition disc soft enough for tight seating, yet stiff and resilient to take hard wear. The disc, cemented in its holder, prevents around-the-disc leakage. The stuffing box with molded asbestos packing is extra deep for durable stem sealing.

No. 130 valves are typical of Crane quality and value, and the complete selection you have in the Crane line in valves and fittings for every flow control need.

You'll find that specifying and ordering Crane materials will lead to lower ultimate costs for your piping equipment.

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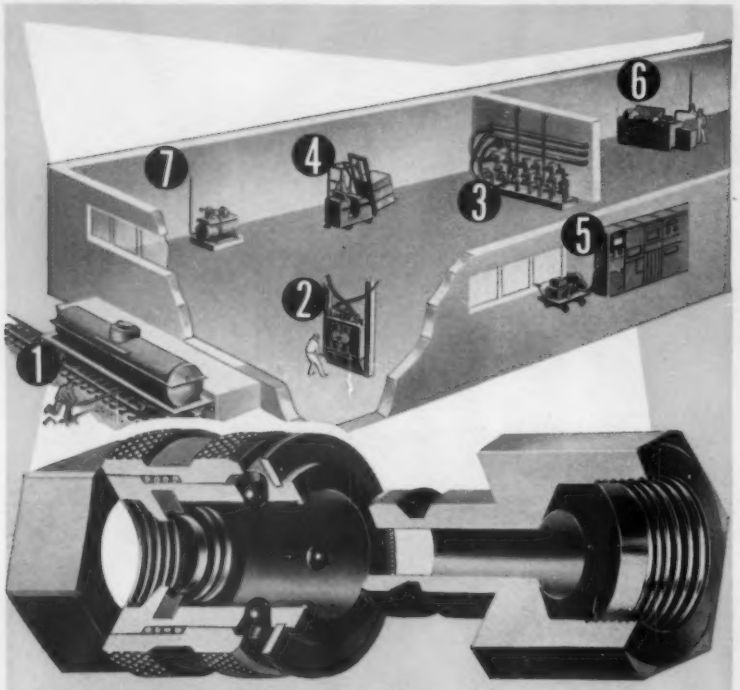

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Titeflex Quick-Seal Couplings for fast, leakproof connections!

Everywhere in industrial operations, you find Titeflex Quick-Seal Couplings "making connections"! And what connections! *Absolutely* leakproof. Couple or uncouple in *one second.* Allow free flow of *any* material. Sizes ¼" to 12".

See drawing for typical uses. Then check your own plant for trouble spots where Quick-Seal Couplings can serve you *profitably.* For details . . . send coupon.

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3. Blending "Switchboards"
4. Lift Trucks—Hydraulic Lines
5. Mobile Testing Equipment
6. Machine Cleaning
7. Air Lines for Tools

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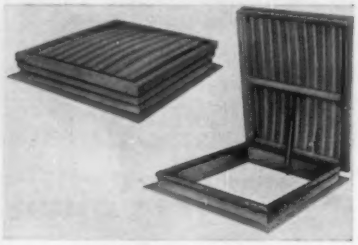
NEW PRODUCTS

(Begins on page 136)

Elastizell, it is explained, is compounded of two basic ingredients—a foaming agent and a water soluble plastic. When these are mixed with wet concrete, the result is a homogeneous cellular or bubble structure, light in weight because of a high volume of air. The plastic agent gives the cells or bubbles a coating of high tensile strength. The homogeneous structure results in a uniform strength, thus reducing the possibility of cracking. Density and physical characteristics of the material are controlled by mixing cycle time and rotation speed of the mixer. It is noted that since Elastizell agents are neutral in the mix and the cellular structure is created mechanically, not chemically, in a special mixer, the resultant concrete is not corroding to steel. Elastizell Corp. of America.

7—PANEL SKYLIGHT of fiber glass, aluminum framed

The Fire-Vent Model Skylight is fabricated of tough fiber glass reinforced translucent structural panels set in an extruded aluminum frame. Construction offers all the features of an outstanding



fiber glass skylight, company points out, yet gives automatic and immediate ventilation in case of fire. When fire or excessive heat occur, a fuseable link separates causing cover section of skylight to open and remain open until manually closed. Opening mechanism consists of an aluminum enclosed spring unit with stainless steel rod, eliminating use of exposed springs. Satisfying requirements that a percentage of roof area be fire vented, the skylight still gives excellent top lighting. It has a self contained curb and roof flange and is designed for installation directly to roof opening—curb construction and curb flashings aren't necessary. The Marco Co.

8—AIR REGULATION for pneumatic instrumentation

Instrument Air Regulator Type 73-26 is announced as providing the close regulation demanded for instrument air supply in pneumatic instrumentation and in other installations requiring sensitivity of pressure output in small volumes of air or other gas. The regulator is designed to offer higher air volumes, improved corrosion resistance, and a 40 micron phenolic impregnated cellulose

(Begins on page 136)

filter. Manufacturer says it has a minimum pressure drift from set point, gives instantaneous response to changes in flow rate, and provides adjustment to within close limits for any pressure within its output range.

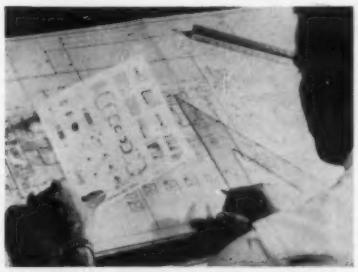
The Type 73-26 can be panel or bracket mounted and serviced without removal from air line. It is available with or without auxiliary pressure gage. Connections are ¼-in. pipe. Maximum input pressure is 300 psig, and maximum output pressure is 40 psig — 100 psig with special spring. Body is of aluminum alloy with stainless and plated steel internals. Black, Sivalls & Bryson, Inc.

9—ROOF COATING goes on smoothly in winter

By adding a non-congealing additive "Perma-Flo" to their liquid roof coating formula, company offers Winterized 3R, suitable for application regardless of temperature. Company states that a need for this product has been urgent because many products used for winter roof repair required heating to achieve proper consistency for spreading. With 3R, no heating equipment is necessary. Material brushes on the surface smoothly and easily regardless of temperatures. Winterized 3R will be available either in aluminum or black. Colonial Refining & Chemical Co.

10—DRAFTING AID speeds graphic panel layouts

For reducing the time required for graphic panel layouts, the Panelgraph Layout Template is described as a precision template with scaled outlines rep-



resenting frequently used industrial instruments scaled at 2 in. to the foot. Also provided are outlines for pumps, valves and other graphic panel symbols. Of frosted Lucite, the Panelgraph costs around $5.00. Panellit, Inc.

11—MIXING PRESSURE TANK for spray-gun set-ups

This mite-sized pressure tank has an air-motored agitator to maintain continuous agitation of finish while the spray operator works. The tank comes in 1-, 2-, and 4-qt sizes. It is designed to give

versatile, durable
Titeflex metal hose . . .
for every type of processing operation

Can take grueling punishment from corrosive fluids, high temperatures, excessive vibration and pressures . . . or from any combination of these industrial *spoilers*. All-metal construction. Wide range of sizes. Braided or unbraided. Choice of alloys and fittings to meet *every* need.

Titeflex Metal Hose finds many important jobs *everywhere*. Investigate your processing operations now and see where Titeflex Flexible Metal Hose can work for you. Send in coupon for important additional information *today*.

1. Fire Extinguisher
2. Air Control Lines
3. Cleaning Vats
4. Air Conditioning Units
5. Milling Machine
6. Hydraulic Press—Lubricating Lines
7. Steam Lines

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TITEFLEX FLEXIBLE METAL HOSE licks corrosion temperature vibration pressure in all industrial operations

For more facts circle 576 on Reply Card

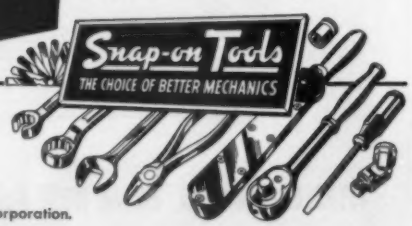
make FAST work of the BIG tie-ups!

Snap-on* EXTRA HEAVY DUTY LOXOCKET WRENCHES

● Because most machine maintenance jobs begin and end with wrench work, *the better your wrenches the faster, surer, safer the job.* Above is a perfect example—no room for a ratchet head or an open-end. But a Snap-on Extra Heavy-Duty Sliding Bar and proper socket gives a man a sure grip and sweeping power.

The full Standard Set of these powerful tools, pictured below, will give your crew the *right* equipment to break loose those big, rusted-on nuts and bolts, or to tighten them up to the limit . . . with no time-wasting makeshifts. There are many more shop-proved Snap-on tools that will save money in your plant—more than 4,000 to meet the widest range of needs. Snap-on gives you close-at-hand service through factory branch warehouses in principal industrial centers. Write for the Snap-on Special Industrial Catalog and 104-page General Catalog.

No. 521-EHD-B Set of EXTRA HEAVY DUTY Snap-on Loxocket Wrenches—21 tools in all.



SNAP-ON TOOLS CORPORATION

8068-B 28th Avenue, Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation.

For more facts circle 577 on Reply Card

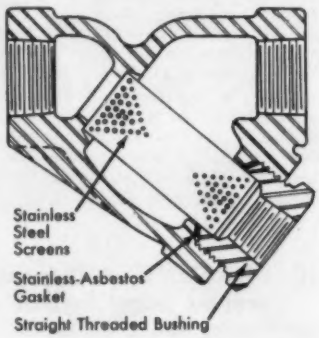
NEW PRODUCTS

(Begins on page 136)

the operator complete freedom and, although first produced for use with manufacturer's own spray guns, it may be used with other makes. Since its agitator keeps the spray material continuously mixed, this tank is reported suitable for handling quick settling finishes, metallics, molded plastic coatings. It is suggested for small parts (areas) production painting, frequent color change production, testing, pilot plant production and similar set-ups. Eclipse Air Brush Co.

12—PIPE STRAINERS for high temperatures, pressures

Six sizes of Y-type carbon moly steel strainers have been added to this manufacturer's line of cast semi-steel strainers. The new strainers are announced for oil, gas, air, water and steam lines, and suitable for pressures to 900 lb and temperatures to 900 F. Maximum pressure at

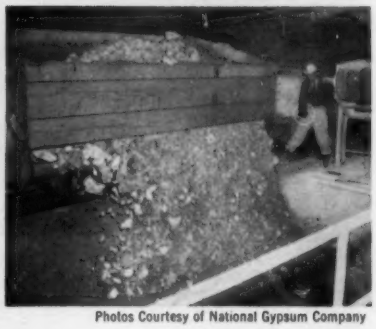


100 F is 1800 psig. The strainers come in ½- through 2-in. sizes, screwed or socket weld. Sizes 1¼ in. and larger have bolted retainer plates; smaller sizes have straight thread screwed bushings.

Stainless steel screens are standard, either 0.045-in. diam holes, 226 per sq in. or 24-by-110 wire mesh. Other screening material is available. Design features include a stainless-asbestos gasket, locked in between body and the base of the bushing to eliminate chance of blowout. List prices of these strainers start at $13.00. Armstrong Machine Works.

13—POLYETHYLENE TANKS for storage and mixing

These molded polyethylene self-supporting tanks are announced for storing and mixing chemical solutions in laboratories or plant-wide production applications. Tanks are suggested for handling electro plating baths, cleaning solutions, and other corrosive media. They are claimed ruggedly built, and non-damageable with conventionally accepted industrial use. In addition, they provide exceptionally long service life with correspondingly negligible replacement costs. Dimensions are 17 by 17 by 17 in.; ½ in. thick walls; ⅝ in. thick bottom; capacity 22 gal.



Photos Courtesy of National Gypsum Company

"I've taken the G-R Sound-Survey Meter *Everywhere!*"

"BUILD BETTER WITH Gold Bond"

says M. C. M. Pollard
Director of Safety
NATIONAL GYPSUM COMPANY

"Over the past three years, I've carried the G-R Type 1555-A Sound Meter with me in visits to 30 National Gypsum plants. The Meter has been used to determine sources of noise in mines, quarries and plant buildings, as well as in trucks, planes and neighborhoods. I have found it to be invaluable in detecting the actual point of the greatest intensity around machines including rock dryers, rock loaders, mine locomotives, crushers, drills, vibrating screens, lift trucks, heavy-duty trucks, cupolas, saws, punch presses, roller, belt and bucket conveyors, packers, rotary mills and many others that would make a long, long list.

"There have been many pieces of equipment which, when discussing them in the office, seemed impossible to control. Upon checking with the Meter and definitely locating the source of the noise, control appeared to be practicable.

"Having had occasion to use the G-R Sound-Survey Meter as well as more expensive sound-level measuring instruments, I am of the opinion that yours does exactly the same job, is easier to use, and, of course, has the advantage of being lower priced."

Compact, Inexpensive, Easily Used By Non-Technical Personnel

This instrument accurately measures sound-pressure levels from 40 db to 160 db . . . has a wide range of application in all fields of industrial-sound measurement: including machinery-noise investigations, hearing damage surveys and speech-interference determinations.

Basically the Sound-Survey Meter consists of a non-directional microphone, calibrated, continuously-adjustable attenuator, a stable four-tube amplifier and a large easy-to-read panel meter; it uses highest quality components for maximum reliability. This unique sound-measuring tool may be the answer to your problem.

Type 1555-A Sound-Survey Meter $135

WE SELL DIRECT
Prices are net, FOB Cambridge or West Concord, Mass.

General Radio Company®

275 Massachusetts Avenue, Cambridge 39, Massachusetts

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920 S. Michigan Ave. **CHICAGO 5** — 1000 N. Seward St. **LOS ANGELES 38**

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LIGHT METERS
MEGOHMMETERS
MODULATION METERS
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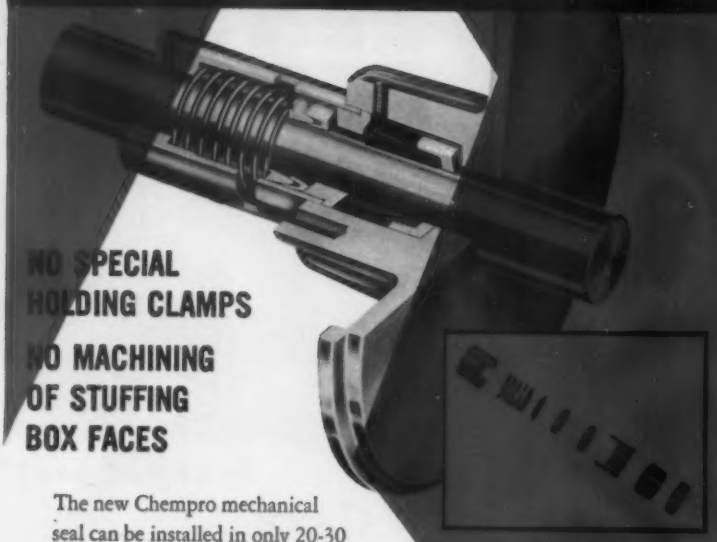
R-L-C DECADES
R-L-C STANDARDS
SIGNAL GENERATORS
SOUND & VIBRATION METERS
STROBOSCOPES
TV & BROADCAST MONITORS
U-H-F MEASURING EQUIPMENT
UNIT INSTRUMENTS
VARIACS
V-T VOLTMETERS
WAVE ANALYZERS
WAVE FILTERS

For more facts circle 578 on Reply Card

NEW CHEMPRO SEAL INSTALLED IN ONLY 30 MINUTES



NO SPECIAL HOLDING CLAMPS

NO MACHINING OF STUFFING BOX FACES

The new Chempro mechanical seal can be installed in only 20-30 minutes—it requires no special holding clamps or machining of stuffing box faces. It is completely interchangeable with stuffing box packing.

Chempro seals give highly economical service on pumps handling acids, caustics, solvents and other chemical liquids and slurries under a wide range of operating conditions. It has been successfully used under slurry conditions that previously could not be sealed by a mechanical seal.

The seal faces rotate within the confines of the stuffing box, eliminating the hazard of dangerous sprays in handling corrosive, toxic, explosive and flammable materials.

OTHER ADVANTAGES

Simplicity of Design—Only 8 pieces, involving no complicated parts • External Seal—adjustable after installation • Chempro Teflon* Packing—Chemically inert • Eliminates Shaft Scoring • Low Power Costs—Minimum friction load on shaft • Custom Built—To meet particular operating conditions.

For complete details write for new Bulletin CP551.

• Patented *du Pont's trademark for its tetrafluorethylene resin

CHEMICAL & POWER PRODUCTS, INC.

The Original Fabricators of Teflon Packings and Gaskets

7 Broadway, New York 4, N. Y.

For more facts circle 579 on Reply Card

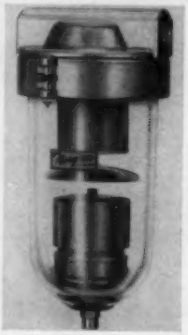
NEW PRODUCTS

(Begins on page 136)

Tanks are reinforced around top with a ½ in. molded flange, and are equipped with a ¾ in. polyethylene drip type faucet for drainage. American Agile Corp.

14—AIR LINE FILTERS with automatic-draining

New and larger sizes have been added to company's line of air line filters with automatic-draining facilities for use with ¾ in. and 1 in. compressed air lines. Models 11,200-6 and 11,200-8 are completely automatic. They are designed to create a strong centrifugal force that removes a high percentage of moisture



from air stream. Both models are available with a choice of three types of filter elements for the removal of solids—the standard 200-mesh wire screen (74 micron) and two optional 64- and 25-micron sintered bronze elements. A float-actuated drain mechanism discharges collected moisture automatically under constant or fluctuating air pressure and with or without air flowing. Protection is provided to prevent entry of solids into drain mechanism, it is noted, and the large water capacity of approximately 1¼ pt (which controls draining frequency) keeps wear on drain mechanism at a minimum. Form 529 gives full details. C. A. Norgren Co.

15—MAGNETS designed for tramp iron removal

This new line of non-electric Alnico Perma-Plate Magnets, for removal of tramp iron and iron of abrasion, is claimed particularly effective in attracting iron from moving material. As explained by company, the step face of these Perma-Plates lets moving material flow smoothly, without interruption by mechanical barriers, while the exposed side of the leading magnetic pole provides a recessed holding zone out of the direct path of the burden. Attached iron cannot be forced from the magnetic surface by heavy or rapidly moving material, it is noted, and the wide gap between poles assures a magnetic field which reaches out effectively.

The line includes four basic types

Maytag switches to STANICOOL HD Soluble Oil— makes two-way saving

1 *Cost of soluble oil reduced*

2 *Soluble oil consumption cut two-thirds*

A 300 ton Verson press at the Maytag plant, Newton, Iowa, is used for piercing holes in the inner tubs of Maytag's fine automatic washers. Material used is 18 gauge enameling iron. Holes are pierced in six automatic cycles. A total of 936–3/16 inch holes and 6–19/32 inch holes are incised in each tub.

A check of manufacturing costs on the tubs disclosed that the cost of soluble oil per unit produced was too high. Standard Oil lubrication specialist J. I. Nelson, working with plant management suggested a switch to STANICOOL HD Soluble Oil. The switch was made and Maytag received the first part of its two-way saving: the cost of soluble oil per gallon was reduced. Then it was found that the same high quality product could be turned out, without loss of tool life, while spraying only every third tub. Formerly *each* tub was sprayed with soluble oil before punching. With STANICOOL HD, soluble oil consumption was reduced two thirds. And thus, Maytag received part two of its two-way saving.

Perhaps STANICOOL HD Soluble Oil can help you make similar savings. Find out. Call your nearby Standard Oil office in any of the Midwest or Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Dwight Norton (right) a Maytag plant foreman inspects automatic washer inner tub with Jesse I. Nelson, Standard Oil lubrication specialist. Jesse Nelson is well qualified to provide lubrication technical service. He has a B.S. degree in engineering from the University of Iowa and has completed the Standard Oil Sales Engineering School. Jesse has been helping customers with lubrication problems for more than three years. Customers find his experience and training pay off *for them.*

STANDARD

STANDARD OIL COMPANY
(Indiana)

For more facts circle 580 on Reply Card

Quick facts about

STANICOOL HD Soluble Oil

- **Emulsifies readily with all waters.**
- **Forms stable, uniform emulsion.**
- **Does not turn rancid.**
- **Non-injurious to men, machines and work.**
- **Economical. Meets work requirements with relatively low emulsion concentrations.**
- **Prevents rusting of work and machines.**
- **Gives better tool life.**
- **Doesn't form gum on machines.**

Here's Lift Power that Lowers Costs!

SIMPLEX JACKS

Engineered to deliver maximum power at minimum weight, Simplex Hydraulic Jacks meet every jacking need with ease, safety and dependability. Eight models, in capacities from 3 to 100 tons, Sold *only* through Industrial Distributors.

Get your free guide to jack selection.
Ask for Bulletin HYD. 53.

A Jack for Every Purpose

The Simplex line of jacks is complete. It includes rachet lowering, track, screw and hydraulic jacks; self-contained and remote-controlled center-hole pullers; trench and timber braces. Buyers have known Simplex means quality in jacks for more than 50 years.

WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS
SIMPLEX
RE-MO-TROL JENNY
UTIL-A-TROL JACKS ROL-TOS

TEMPLETON, KENLY & COMPANY
2561 Gardner Road
Broadview, Illinois

For more facts circle 581 on Reply Card

NEW PRODUCTS

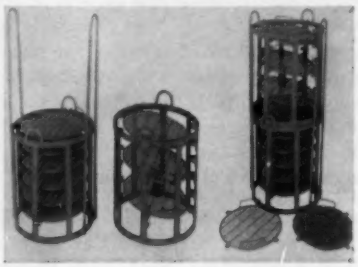
(Begins on page 136)

which differ in magnetic range from 2½ in. or under, through 4 in., and there are 35 standard sizes, from 4 through 72 in. wide, in each type. Perma-Plates can be applied to separate iron from grain, chemicals, foodstuffs, plastics, minerals, textile fibers, and wet and dry solids. They may be installed in open or closed chutes of wood or metal, in ducts or spouts, above conveyors. Manufacturer says they can be adapted to sweepers and can be installed outdoors, in hot or cold locations, in any position and for standard or high temperature materials. Further details are in Catalog 1205-D. Dings Magnetic Separator Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 201-202.

16—RETORT BASKET holds tools of all sizes

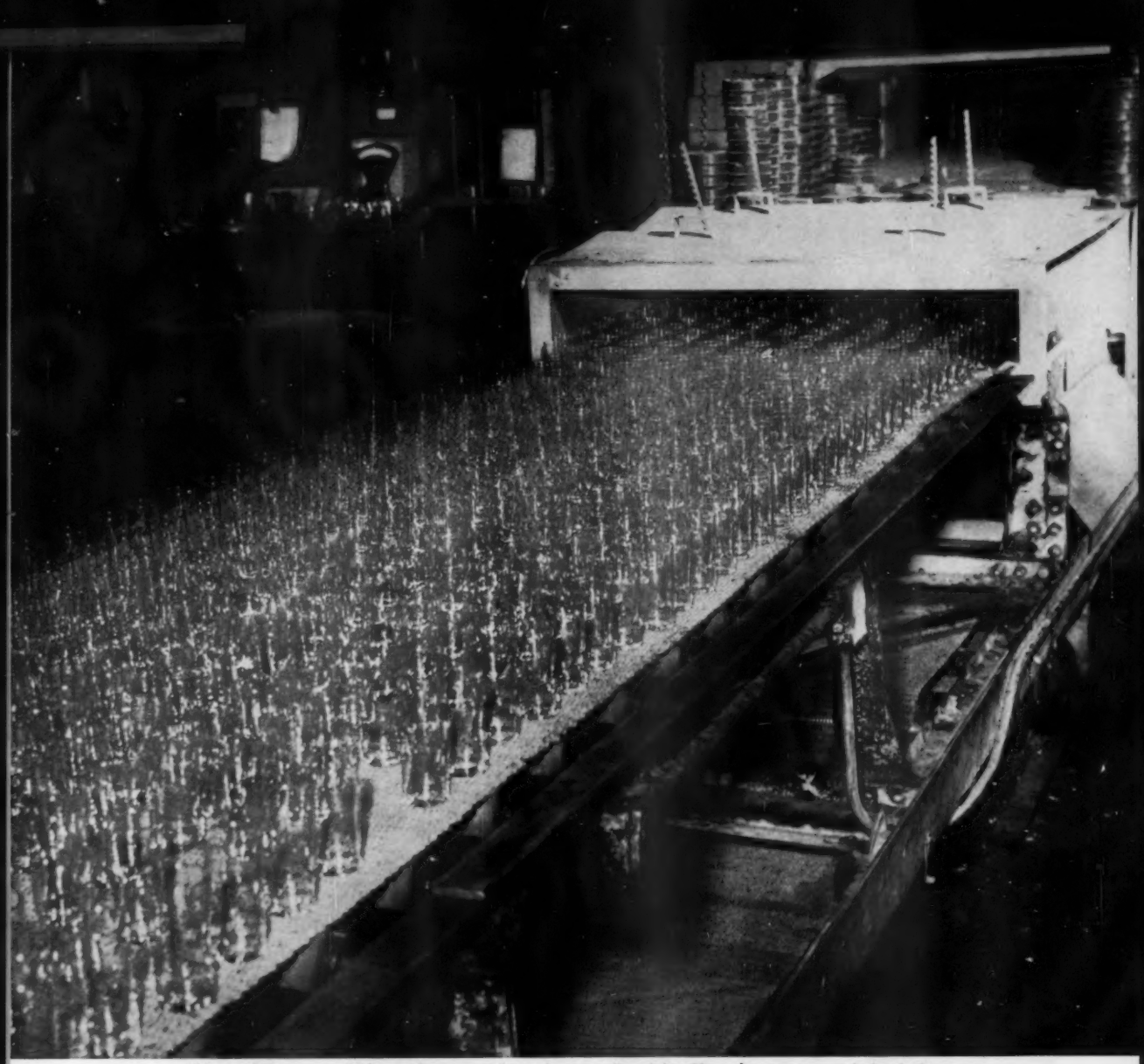
Made of Type 330 alloy throughout, this heat treating retort basket holds tools of all sizes and eliminates danger of their falling through grid while being processed in pit-type furnaces. Mesh openings for



each Inconel grill are spaced differently to allow tools of various sizes to be placed on separate wire shelves for perfect holding in between mesh openings. Grills may be slanted or placed horizontally. Fixture carrier measures 15½ in. diam by 36 in. deep OD. Top and bottom rings and eight side braces are 1 by ¼ flat bar. Handles are of ½ in. diameter rod, 2 in. above the basket. Stacking handle is 38 in. deep. Wiretex Mfg. Co.

17—MOTOR GENERATOR gets d-c from a-c power source

Type LB, fractional horsepower motor-generator sets, in frame sizes 44, 66 and 74 are recommended as an inexpensive and reliable means of obtaining d-c from an a-c power source. Units are used as a power supply for product testing, as power supply for variable speed motors, and as self-contained exciters of larger



Wissco Belts carry Libbey glassware through annealing lehr. The glassware—and the belts—are subjected to elevated temperatures for approximately an hour. This is another example of how...

FAMOUS NAMES

ride on WISSCO BELTS

Libbey Glass Division of Owens-Illinois

Libbey is a name that's well known for glassware of top quality. For its annealing operation, which helps insure this quality, Libbey purchased four Wissco Belts of thin, flat construction with improved lehr edge. High heat is applied at the beginning of the operation, and then gradually diminished. The glassware emerges at the cool end of the lehr with stresses and strains equalized. Wissco Alloy Processing Belts are the choice of many famous names in industry—leaders in their fields. You, too, will find Wissco the most economical and efficient belt for every processing operation—for metals, ceramics, glass annealing and decorating.

For details, *write or call our nearest office:*

THE COLORADO FUEL AND IRON CORPORATION
Denver and Oakland

WICKWIRE SPENCER STEEL DIVISION
Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans
New York • Philadelphia

WISSCO BELTS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CF&I

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2769

you save engineering time

with complete hanger assemblies

To save many hours of engineering time and to speed up your specifications, use Blaw-Knox overhead roller assemblies, rigid hanger assemblies, functional spring hangers with the patented *internal swivel action*, constant support spring hangers and vibration eliminators.

Each is a complete unit, designed for a specific purpose. Constructed to comply with the "code for pressure piping." Available in types and sizes to meet varying conditions.

And each is ready to install, which eliminates expensive cutting, threading and assembling in the field.

Our experienced engineers are available to both design and make recommendations for your hanger requirements.

Write for your copy of Bulletin No. 54 to get complete information

BLAW-KNOX COMPANY
Power Piping and Sprinkler Division
Pittsburgh 33, Pennsylvania

BLAW-KNOX **PIPE HANGERS**

Complete line of functional spring hangers • constant support spring hangers • rigid hanger assemblies • overhead roller assemblies • supports • vibration eliminators . . . plus complete prefabricated piping systems for all pressures and temperatures

For more facts circle 583 on Reply Card

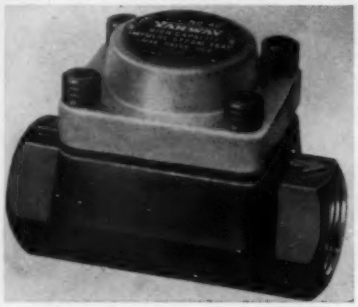
NEW PRODUCTS

(Begins on page 136)

units. They are also used to supply energy for such industrial devices as magnetic chucks. Continuous operation at rated load is made possible by a ventilating system incorporating a fan on the shaft between units. Air enters through side vents, passes over both units, and is exhausted through bottom. Both motor and generator rotors are mounted on a common shaft. Compound-wound units are of drip-proof, ball-bearing, solid base design. They are available in various input combinations of standard frequencies, voltages, and phases, and with 250, 500, and 750-w d-c outputs. General Electric Co.

18—IMPULSE STEAM TRAP for heavy condensate loads

Capacities of the new No. 40 Series of Yarway Impulse Steam Traps are announced as approximately two to three times that of company's same size standard No. 60 Series. Major features reported include high capacity at pressure



up to 600 lb, stainless steel body and internal parts, excellent low pressure operation (no orifice adjustment is required 0 to 600 lb), steam temperature condensate discharge characteristics, freeze-proof operation against back pressure to 50 per cent, and suitability for applications where dirt and scale are a problem. Typical applications of these traps are on unit heaters, heating coils, storage water heaters, kettles, large fuel oil preheaters, dryers, autoclaves, heat exchangers etc. Now available are ½ and ¾ in. sizes, and larger ones are planned. Bulletin 1746 gives data. Yarnall-Waring Co.

19—RESIN COATING for industrial maintenance

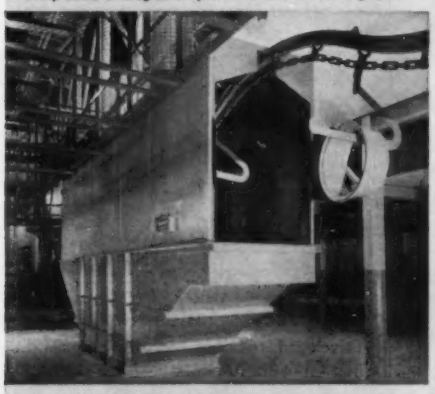
Glid-Iron is announced a 100 per cent solids resin coating—a labor-saving, low cost solution to the maintenance and upgrading of wood, metal and masonry surfaces. Although developed for use on wood floors and walls of freight cars, Glid-Iron has characteristics that give it broad application in industrial maintenance. In addition to adhesion to wood, metal and concrete, it is claimed highly resistant to chemicals, thus suggesting

COMPLETE *Finishing* SYSTEMS

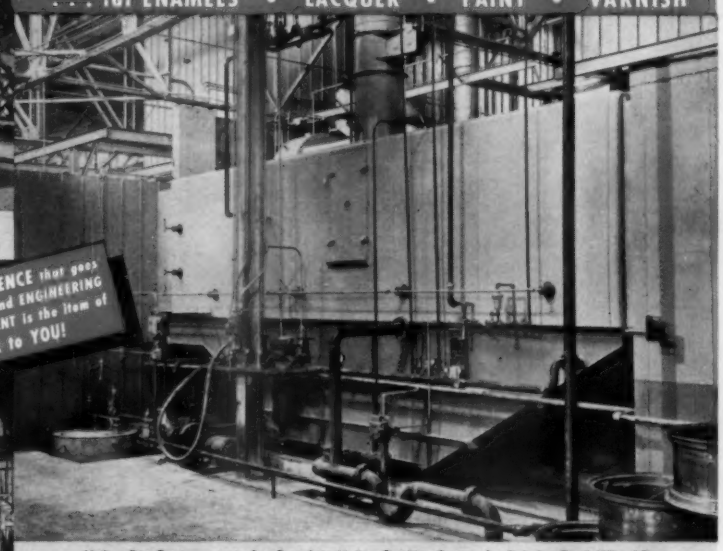
. . . for ENAMELS • LACQUER • PAINT • VARNISH

Mahon Six-Stage Metal Cleaning and Rust Proofing Machine—part of a Complete Mahon System for Painting Truck Wheel Rims.

Mahon Overhead Finish Baking Oven with Drip Enclosure and end of Dip Coater in foreground—part of the same Rim Painting System.



Mahon Dip Cooling Unit designed to expedite cooling of Rims emerging from Finish Baking Oven to handling temperature.



Mahon Dip Coater—part of a Complete Mahon Finishing System for Painting Truck Wheel Rims. Paint Mixer and other facilities are provided to maintain Epon Paint at constant temperature.

Complete Mahon DIP COATING System Finishes Truck Wheel RIMS at MINIMUM COST!

Illustrated here are major units of processing equipment which, with other facilities, make up a Complete Mahon Finishing System designed especially for coating truck wheel rims with Epon Paint. The system includes a Six-Stage Metal Cleaning and Rust Proofing Machine, Cooling Tunnel, Dip Coater, Ventilated Drip Enclosures, Filtered Air Supply System, an Overhead Finish Baking Oven and a Dip Cooler. This is another typical Mahon solution for a manufacturer with a particular finishing job . . . it produces a fine finish in minimum time with a minimum of attention, and at an absolute minimum cost per unit painted. If you have a finishing problem, or are contemplating new finishing equipment, you, too, will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified also, to do the all-important planning and engineering of equipment—which is the key to fine finishes at minimum cost. Whether you require a Complete Finishing System for Spray Painting—either Manual or Electrostatic, Flow Coating or Dip Coating, you will find, if you investigate, that Mahon equipment will serve you better . . . because, Mahon equipment is engineered better and built better for more economical operation over a longer period of time. You can rely on Mahon to do the complete job on one contract—undivided responsibility for the entire system insures proper coordination and safeguards you against complications which may upset your production plans and subsequent schedules. See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-656.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

For more facts circle 584 on Reply Card

Just what you have been looking for

THE ANSWER TO your corrosion problems

A completely new sixteen page bulletin on corrosion proof materials of construction. . . . Individual sections on CORROSION PROOF CEMENTS, PROTECTIVE COATINGS, TANK LININGS and RIGID PLASTIC STRUCTURES and PIPE . . . also sections including engineering design and corrosion resistance charts.
This bulletin is filled with valuable information on 18 materials that can be used to give you plant-wide protection from corrosion.

FOR YOUR COPY WRITE TO

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

TECHNICAL REPRESENTATIVES THROUGHOUT THE UNITED STATES
For more facts circle 585 on Reply Card

NEW PRODUCTS

(Begins on page 136)

its use as floor coating in food and chemical plants and machine shop areas. It is also said to have outstanding resistance to shock impact, and to withstand temperatures from —20 to 212 F, and to provide a skid-proof floor surface.

Glid-Iron may be applied by spray, brush, roller or squeegee in any mil thickness, ⅛ to ½ in. if desired. Capable of smoothing out and bridging small cracks, the coating sets to a hard, tough, flexible and scuff resistant finish after overnight curing, it is stated—nails can be driven through the film without it chipping. Glid-Iron can be had in any color. Its application cost is given as 15 to 19 cents per sq ft. The Glidden Co.

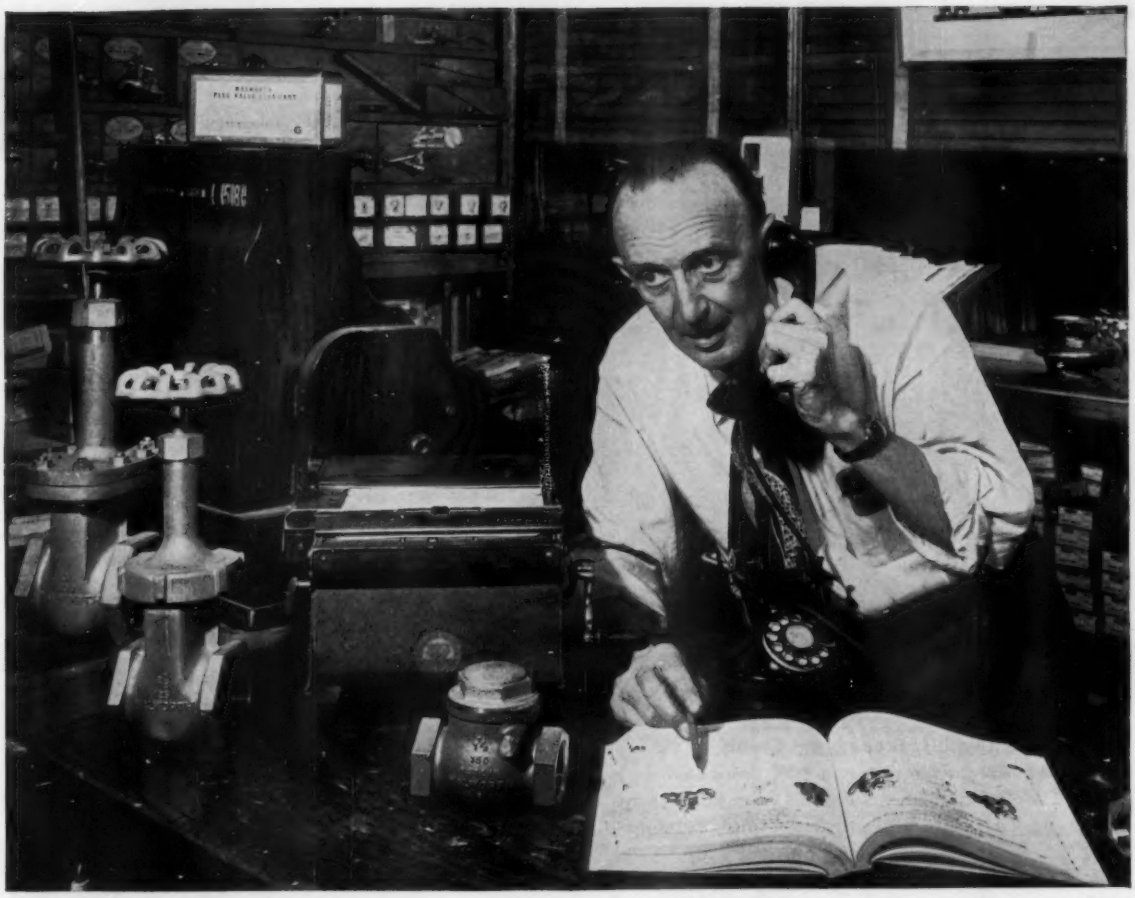
20—MOVING DOLLIES withstand loads to 90 tons

Mighty Movers, sold in sets of four, bolt on to machinery like oversize roller skates. The equipment is then pushed or moved with a pry bar. Designed to withstand loads to 90 tons, these dollies have

two 4-in. roller-bearing cast iron wheels enclosed in a heavy steel frame. A top swivel plate has a ½-in. threaded hole to which machinery is bolted after it has been raised with a movers jack or fork lift. Uneven or rough floors can be negotiated as well as turns, says manufacturer, since the Mighty Movers can swing a full 360 deg. Each dolly is 9 in. long and 5 in. wide and high and weighs 40 lb. Increased safety of personnel is an advantage announced for Mighty Movers because they roll easily and eliminate heavy lifting. Mighty Mover Co.

21—SHELL-TUBE HEATER for process industries

Developed to heat corrosive liquids in glass tubing by introducing steam into an enclosing steel jacket, this shell and tube heater is a 50 sq-ft capacity unit. Twenty-six ¾-in. thin-wall Pyrex brand glass tubes are mounted inside an 8-in. diam. steel jacket. Live steam, from an inlet in the middle of the unit flows to both ends of the 12-ft tube, condenses on the glass tubing, and the condensed water flows to a condensate drain.



*Fictitious name used to typify over 400 Walworth Distributors

Here's why it pays to do business with distributors like Mr. Hansen*

Andy Hansen is typical of Walworth Distributors throughout the nation. He has been a distributor of Walworth Valves and Fittings for years. Like Andy, the Walworth Distributor in your area provides these services and savings:

He reduces your inventory costs. He's aware of the valve and fitting needs peculiar to his area. He stocks the products that will best serve your needs. Deliveries are always prompt and economical – emergency orders can generally be delivered within hours.

He offers you application and engineering assistance. His technical experience can be invaluable in solving your particular problems. He has 50,000 Walworth products at his disposal. You can be sure that the items he recommends are exactly right for the job.

He is a double guarantee. His business depends upon providing you with the very finest products and unsurpassed service. Every valve and fitting is backed by his own reputation and that of Walworth – a complete line manufacturer.

There's a Walworth Distributor near you ready to help. Call on him today.

WALWORTH

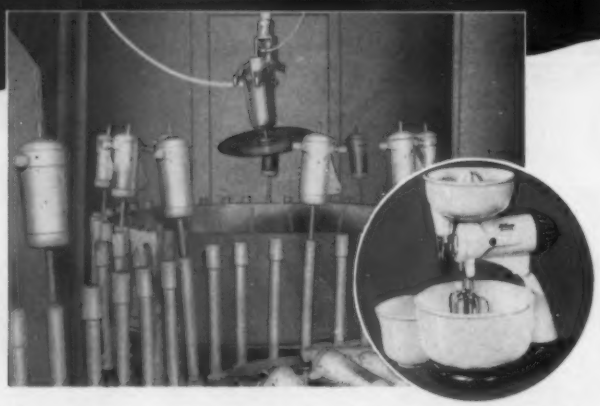
valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

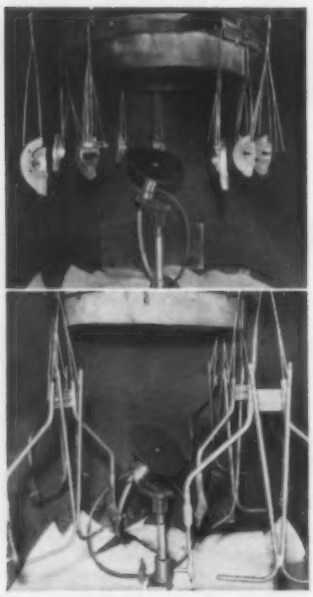
Walworth Company of Canada, Ltd., Toronto

For more facts circle 586 on Reply Card

Sunbeam is particular about the uniform high quality finish on their products, so SUNBEAM relies on RANSBURG NO. 2 PROCESS Electrostatic Spray Painting



Along with improving the quality of the brilliant white finish on Mixmaster parts, an 80% paint savings was achieved when SUNBEAM switched from hand spray to RANSBURG Electrostatic Spray Painting



Protective clear lacquer is applied to upper saw guard (upper left) with RANSBURG NO. 2 PROCESS on this line in SUNBEAM's plant 2, Chicago. Other hardware items, including the Drillmaster and Sunbeam Sander are lacquer-coated electrostatically here. Lawn mower parts, such as the handles shown (lower left), the Rain King lawn sprinkler base, and the Sunbeam Fryer base also are painted efficiently with Ransburg No. 2 Process Electro-Spray.

Regardless of the type of product you manufacture, if it's painted—and if your production justifies conveyorized painting—you should look into the savings and improved quality which can be yours with one of the Ransburg Electrostatic Processes. May we tell you about complete Ransburg services, including the test painting of your products in our laboratories?

WRITE TO DEPT. P.E.

Ransburg **ELECTRO-COATING CORP.**

RANSBURG

Indianapolis 7, Indiana

For more facts circle 587 on Reply Card

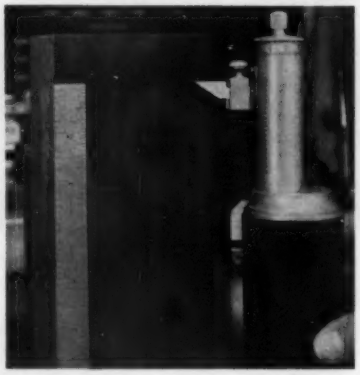
NEW PRODUCTS

(Begins on page 136)

Field tests on the heater are reported to show it economical to operate and maintain. particularly in the rayon industry, where it is being used to reheat sulfuric acid spinning baths. Company says it can be used to heat any corrosive acid (except hydrofluoric) as well as coke by-product corrosive oils and liquids for steel pickling and electroplating. This heater has carried heat loads of 975,000 Btu/hr, it is noted. Maximum operating temperatures are given as 450 F at the steam inlet and 200 F in the glass tubes. Flow capacity is about 270 gpm. The glass tubing is cleaned by recirculating a dilute solution of hydrochloric acid. Corning Glass Works.

22—HEIGHT GAGE for inspecting metal dies

Used for laying out and inspecting metal dies, the Micro-Height Gage is read like a micrometer without further calculations. The result, according to manufacturer, is faster and more accurate read-



ings. The basic gage has a 2-in. direct reading in thousandths which may be increased to 3 in. by reversing the scriber. By adding a 3-in. riser to the base, as shown, the gage's capacity extends to 6 in. To determine distances between heights or holes, a dial indicator is used in place of the steel scriber. The gage has chrome finish. The Greist Mfg. Co.

23—VALVE, tight closing, for dead-end or full shut-off

Designed to meet the need for a tight-closing valve with good modulating characteristics, the Type MA is declared particularly applicable on medium and high pressure pipelines for difficult dead-end or complete shut-off service. While engineered to avoid sticking and clogging, this valve has no tendency to chatter or rattle, says manufacturer, and has functioned quietly on pipelines with pressures to 250 psi. Available in sizes from ¾ to 2 in., the valve body is case bronze. Poppet, seat insert, pilot poppet and pilot seat are stainless steel and the stem is Monel. Sizes ¾ to 1½ in. have union

MODERN STOKER-FIRED BOILERS

Despite the relatively wide extent to which oil – and gas – have come into use for firing industrial boilers, the fact remains that coal continues to be the most economical fuel available in many areas.

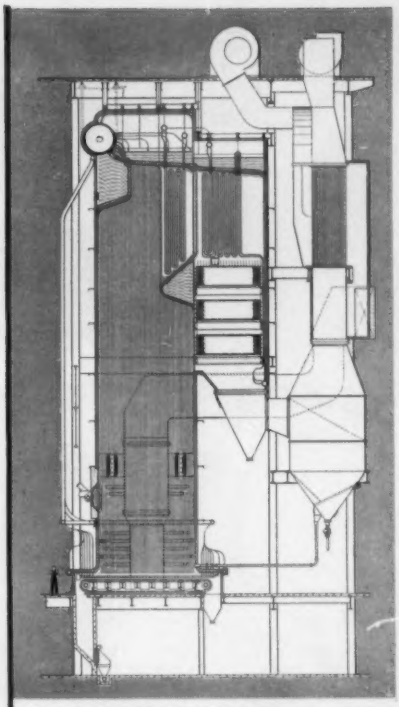
Moreover many potential coal users are unaware of the tremendous improvements that have been made in recent years in the design and general effectiveness of mechanical stokers. Here at Combustion virtually the entire stoker line has had extensive design changes, all directed at improved performance. But overall performance is tied in inescapably with boiler performance. At Combustion you have the important advantage of dealing with a leading boiler manufacturer that also offers the most complete line of stokers available anywhere. You are assured, therefore, of a completely coordinated design comprising stoker, boiler, furnace and – if desired – heat recovery equipment and/or auxiliaries, all engineered specifically for your particular requirements.

Displayed below are three – of the many – C-E stoker-fired boiler designs which, collectively, are suitable for any coal-firing conditions.

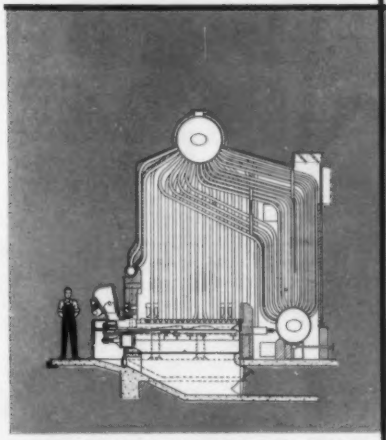
At the right is illustrated the latest – and largest – example of the C-E Bark-burning Unit, a design pioneered by Combustion and now widely used for burning bark, hogged-wood and other waste wood fuels.

So – when you are in the market for coal or other solid-fuel-burning units it will certainly be to your advantage to find out what Combustion Engineering has to offer. Our engineers will be glad to discuss your needs with you or your consultants.

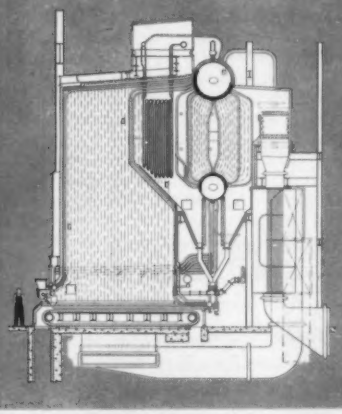
B-892A



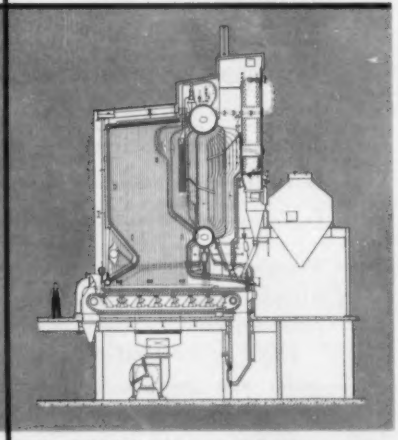
C-E BARK-BURNING UNIT for a paper company. This is a very large unit; capacity – 450,000 lb steam per hr, operating pressure – 1335 psig; total steam temperature – 958 F. It is designed to burn bark, natural gas, oil or any combination thereof. These units are in service for capacities as low as 20,000 lb of steam per hr.



THIS C-E VERTICAL-UNIT BOILER, TYPE VU-10 fired by a C-E Underfeed Stoker, Type E is for a dairy. Capacity is 30,000 lb steam per hr at 150 psig. VU-10 Boilers are available for capacities from 10,000 to 60,000 lb of steam per hr. They are often equipped with C-E Spreader Stokers, dump grate type.



ONE OF TWO DUPLICATE UNITS for a chemical company comprising C-E Vertical-Unit Boilers, Type VU-40 fired by C-E Spreader Stokers, continuous discharge type. These are baffleless boilers designed for a capacity of 150,000 lb steam per hr at 900 psig and 808 F. Coal is Eastern Bituminous.



THIS C-E UNIT is being installed for a soap company. It comprises a C-E Vertical-Unit Boiler, Type VU-50 fired by a C-E Traveling Grate Stoker. Coal used is Midwest Bituminous. This boiler is designed for a capacity of 100,000 lb steam per hr at 850 psig and 585 F. It is an outdoor type unit.

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

CANADA: COMBUSTION ENGINEERING—SUPERHEATER LTD.

STEAM GENERATING UNITS; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; DOMESTIC WATER HEATERS; SOIL PIPE

For more facts circle 588 on Reply Card

Two Goulds 2 x 3—9 Fig. 3305 two-stage centrifugal pumps on boiler feed service. These pumps are available in five sizes with capacities to 1200 GPM, heads to 1000 ft.

7 *design features*

improve pump operating efficiency

Every one of these features is *standard* with this new Goulds Fig. 3305 two-stage centrifugal pump:

1. **Renewable stuffing box bushings.**
2. **Bearing housings sealed against moisture and dirt.**
3. **Cowl-type glands suitable for use with quenching liquids.**
4. **Stainless steel impeller keys.**
5. **Teflon water-seal rings.**
6. **Die-formed stuffing box packing.**
7. **Corrosion-resistant gland bolts.**

Together, these seven construction features give you, without extra cost, a quality of service that's unique in general liquid-handling pumps.

The Fig. 3305 offers other advantages, too. For example, you can choose either a conventional stuffing box or a mechanical seal—and change from one to the other at any time. Also, extensive interchangeability of parts helps keep your parts inventory low.

Bulletin 722.6 gives the complete story of Fig. 3305 advantages, including specifications, performance curves, and interchangeability charts. Write for a copy.

MEMBER HYDRAULIC INSTITUTE

Goulds PUMPS INC. Seneca Falls New York

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA • PITTSBURG • TULSA

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NEW PRODUCTS

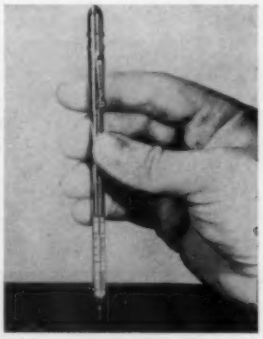
(Begins on page 136)

ends; 2-in. size has flanged ends.

The MA Valve, which is piston balanced, contains a poppet that is directly operated by the valve stem, and hence is considered full modulating. According to company, maintenance of this valve is simplified by readily available replacement assemblies of: valve stem and pilot poppet; main poppet and pilot cage; seat insert and piston. Sylphon Div., Robertshaw-Fulton Controls Co.

24—THICKNESS GAGE for non-magnetic coatings

Consisting of a light magnet attached to a spring and contained within a pencil-size tube, the Tinsley Thickness Gage measures thickness of paint or plating on ferrous bases. Company says this simple gage will determine thickness on radii (irregular or curved surfaces present no problem); will not damage coatings, and is not affected by vibration and



temperature. There are two scales: one for standard calibration for non-magnetic coatings on a mild steel base, and on the reverse side of the gage, a linear scale 0-10 units for special calibrations. Mean accuracy is given as ± 15 per cent or 0.0001 in., whichever is greater, and range is 0.0002 to 0.015 in.

To make a measurement, the exploring head or magnet is placed on the surface and the body of the gage drawn away, thus extending the spring. The spring extension, shown on the scale, is proportional to the force required to detach magnet from surface. The reading is taken at the point when the magnet breaks away from the surface, and from a calibration curve the coating thickness is determined. Bulletin 28P1-53 gives details. James G. Biddle Co.

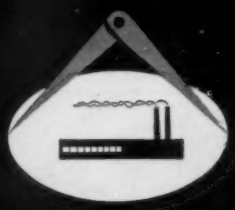
25—DUST COLLECTOR for small woodworking shops

The Dustman is announced as a powerful, portable, self-contained dust collecting system using a standard garbage or ash can as its waste receptacle. When the can is full, you simply remove the unit and empty. The Dustman collects

Using

DU PONT ELASTOMERS

NEOPRENE - HYPALON®



in Industry

HYPALON® tank linings for strong oxidizing agents

Now a wide range of chemicals can be safely handled by storage tanks and shipping containers for long periods. The secret is a lining made of HYPALON, Du Pont's new synthetic rubber. Tank linings of HYPALON have extra-high resistance to chemicals—even the strongest oxidizing agents have little effect on linings of HYPALON.

But exceptional chemical resistance is just part of the story: HYPALON also withstands temperatures from 250°F. to 350°F. It is *completely unaffected* by ozone and can take prolonged exposure to weathering and sunlight without deteriorating.

TANK LINED with HYPALON for storage of calcium hypochlorite. HYPALON is applied by standard lining methods, adheres firmly.

HYPALON can provide extra-high durability to products exposed to severe service conditions; such as hose for handling strong acids and hot fluids; gaskets and packings in high-temperature service; protective coatings for metal and masonry; and many others. To become acquainted with Du Pont HYPALON—just clip and mail coupon.

For more facts circle 590 on Reply Card

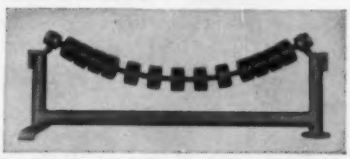
Flexible NEOPRENE idlers for conveyor belts outlast steel idlers better than 8 to 1

NEOPRENE IDLERS are still in service after two years. Accumulated sand previously fouled the steel idler bearings, stopped the idlers and damaged the belt. Average service was three months.

NEOPRENE resists abrasive action of sand, retains its flexibility

At one point in the production of castings at a magnesium foundry in the Midwest a conveyor belt carries molding sand from a chute up a 35° incline to another belt. Sand builds up under the belt. When the belt ran on steel idlers, sand fouled the bearings, jammed the idlers and damaged the belt. Average service life of the steel idlers was three months.

The manufacturer decided to install flexible idlers made of neoprene. The new idlers, developed by Joy Manufacturing Company, consist of neoprene discs permanently bonded to a flexible neoprene-sheathed steel cable and suspended from a single sealed bearing at each end. These end bearings are up out of the sand so spillage does not affect them. The discs supporting the belt, being flexible, conform to the shape of irregular loads, reducing loss of material through spillage. The idlers clean themselves because constant flexing forces the sand from



NEW IDLERS consist of resilient neoprene discs permanently bonded to a flexible neoprene-sheathed steel cable which is suspended from a single sealed bearing at each end.

between the rotating discs. Neoprene was the natural choice for this use because of its lasting resilience and resistance to the abrasive action of the sand. After two years—*more than eight times the service life of the steel idlers*—the neoprene idlers are still on the job.

Specifying neoprene in the rubber products you use can lower replacement and maintenance costs. Of all general-purpose elastomers, only neoprene possesses a *balanced combination of properties*. For more information on neoprene, mail the coupon below.

DU PONT
REG. U. S. PAT. OFF.

HYPALON *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Please send further information and add my name to the mailing list for your free publications, the "Neoprene Notebook" and "Facts about HYPALON®," which show how the Du Pont elastomers are used to cut maintenance and replacement costs, improve production.

E. I. du Pont de Nemours & Co. (Inc.)
Elastomers Division, Dept. PL-2
Wilmington 98, Delaware

Name_____ **Position**_____

Firm_____

Address_____

City_____ **State**_____

The mails go through . . . on Imperial Belts

One post office alone uses 29 miles of Imperial Belting, some in service since 1916

In many large U. S. Post Offices and Railroad Terminals Imperial INNERLOCKED* Conveyor Belts help the Postal Service maintain its tradition of always getting the mails through on time. These dependable belts operate year-in and year-out, transporting millions of mail sacks.

In one major-city post office alone, 29 miles of Imperial Belts are in daily use. In another installation, officials reported newly-installed conveyors equipped with Imperial Black Rexall Belts paid for themselves in only 11 months through reduced handling costs.

Superior Construction

Imperial Black Rexall, a strong, flexible, tractive belt that will not deteriorate with age, is the usual choice for such service. It's made of heavy-duty hard silver duck, double stitched with INNERLOCKED* stitches. Exclusive Imperial impregnating compounds lubricate, toughen and strengthen the belt.

Job-designed Belting

Other brands of Imperial Belting are similarly job-designed for specific operating conditions. There are acid, oil, moisture and heat-resisting belts . . . others for conveying hot rubber, handling foodstuffs, or similar special applications. Whatever your needs, there's an Imperial Belt that will last longer and cut conveying and elevating costs. Write, describing your problem, or request informative new Catalog 54-3 which explains the principal Imperial Belts.

*INNERLOCKED—Reg. trade name of Imperial Belting Co.

Imperial INNERLOCKED* BELTING
First in stitched canvas belting for over 45 years

You expect more from Imperial . . . and you get more!

Imperial Belting Company
1759 S. Kilbourn Avenue
Chicago 23, Illinois

For *new* conveyors and elevators, specify and insist on Imperial for lowest ultimate belt cost. Write for Catalog 54-3.

For more facts circle 591 on Reply Card

NEW PRODUCTS

(Begins on page 136)

sawdust and dust right at the machine. It is also used for cleaning the machines, wood working or metal, for cleaning displays and for general cleaning in the shop and work areas.

In operation, the Dustman draws in the sawdust or dirt through the hood and 2½-in. diam hose. Suction is created by an 8-in. pressure type blower. Sawdust and waste are drawn through the blower and deposited in the waste can, and free air is permitted to escape through a filter bag on top the machine. There are no internal filters. The Dustman is powered by a ⅓-hp motor, and will operate on a 110-120 v, a-c single phase system. Its hose is 6 ft long. The unit sells for around $90, less can. Accessories are available to increase its versatility. Craftools, Inc.

26—INDICATOR-CONTROLLER with pneumatic transmitter

Type RI Indicator-Controller is now available with pneumatic transmitter, it is announced, as well as micro switches for electrical control. A low-cost instrument designed primarily for measurement and control of solution concentration, controller is a self-balancing a-c Wheatstone bridge available with manual or automatic temperature compensation for electrolytic conductivity measurement. The introduction of the pneumatic transmitter on the RI permits operation of pneumatic control devices, remote recorders and indicators. Instrument is available with a single pneumatic transmitter and/or up to four micro switches. Industrial Instruments, Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 201-202.

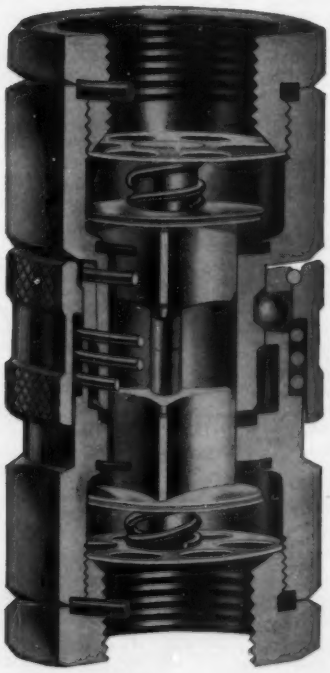
27—ELECTRIC SHEAR features fast cutting action

This electric powered, throatless shear incorporates a unique shearing action, it is announced, to provide fast, easy cutting of any shape in metal up to 10-gage mild steel. Shear is complete with base and supporting column which brings it to efficient and comfortable working height from floor. By removing supporting column, shear may be used with base. Eccentrically mounted cutter head imparts a downward-forward motion to upper blade which shears the metal rather than punching through it. This provides cleaner cutting, company points out, while assuring longer blade life.

Accurate cutting to a line or template is also possible because operator may use both hands to feed work. Throatless design permits turning sheet in any di-

DISCONNECTED IN 1 SECOND

and NO DANGEROUS SPRAY



INSTALL SNAP-TITE "H" COUPLINGS:

- Snap-Tite "H" Series couplings are constructed so that the valve is completely closed in coupler before disengaging the nipple seal, eliminating fluid spray, and the only loss of fluid is the few drops in the nipple cavity.
- Powerful springs keep valves shut tight when "H" couplings are disconnected.

Check your couplings. Are they creating accident hazards and losing costly fluids? Are offensive odors and flammable gases escaping from them?

SNAP-TITE'S "H" COUPLING, SIZE FOR SIZE, IS THE SMALLEST COUPLING WITH HIGHEST STRENGTH AND HIGHER EFFICIENCY

Recessed valve washers . . . fluted valve stems . . . valve stops with minimum flow restrictions . . . large inside diameter—these combine to allow maximum flow capacity with lowest pressure drop.

Available in sizes ⅛" to 10" in alloy steel or to specifications

SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

See the Snap-Tite representative in your city or write for Bulletin 240A

Snap-Tite, INC.
UNION CITY 1, PENNSYLVANIA

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Algas engineered protection

MEANS MORE WHEN YOU CONSIDER AN LP-GAS STAND-BY PLANT

ALGAS installation at Ford Motor Co.
Milpitas, California

Industrial firms install LP-Gas stand-by plants for one purpose . . to assure year 'round gas supply during shortage of natural gas or sudden interruption of service.

There's a big difference in operating costs and performance in LP-Gas stand-by plants. This difference lies in how well the system is engineered for the plant it is to serve. Backed by nearly a quarter of a century of experience, ALGAS LP-Gas plants provide maximum economy and trouble-free performance from every point. ALGAS equipment is specifically engineered for each plant.

Whatever your application may be, you can purchase ALGAS equipment to fit your requirements on an economical basis. Plants start with tanks of 1,000 gallon capacity and range upward. Our engineering staff is at your disposal to offer recommendations for the type and capacity of equipment which your plant requires. Mail the coupon below for complete information.

★ NO MORE PRODUCTION SHUT-DOWNS

★ NO ADDITIONAL LABOR OR MAINTENANCE REQUIRED

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Los Angeles 21, California

American Liquid Gas Corporation
1109 Santa Fe Ave., Los Angeles 21, Calif.

Please furnish us complete information regarding your LP-Gas stand-by plant equipment.

Firm_____

Address_____

City_____ Zone____ State_____

For more facts circle 593 on Reply Card

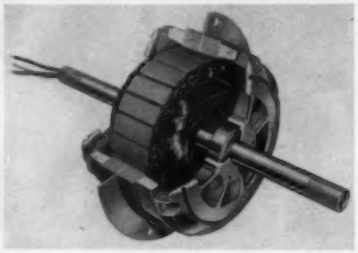
NEW PRODUCTS

(Begins on page 136)

rection during cutting. Powered by a 60 cycle, 120-v a-c motor, shear produces 1725 cutting strokes per minute. It will slit 12-gage mild steel at rate of 15 fpm, company points out, and lighter gages much faster. High carbon, high chrome upper and lower blades are adjustable for wear, and may be removed. Beverly Shear Mfg. Co.

28—FHP MOTOR designed for centrifugal blowers

Specifically engineered to realize the maximum benefits inherent in centrifugal blowers, this integral drive fractional horsepower motor features an "inside-out" design, with the rotor on the external surface revolving around a stationary shaft and field coil assembly. A

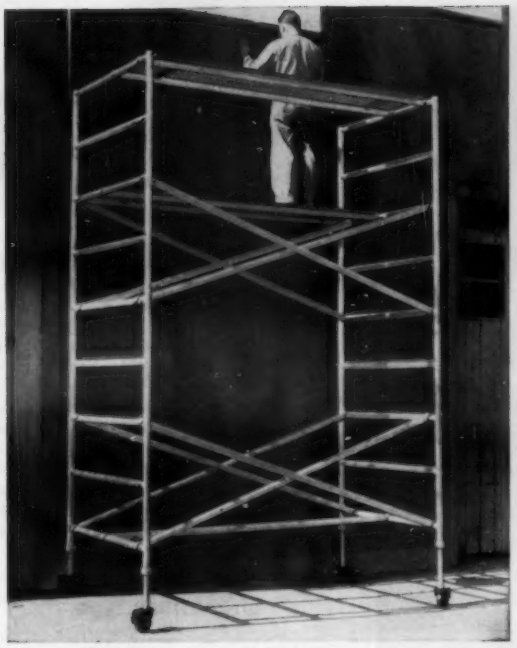


mounting hub, cast as an integral part of the rotor assembly, attaches directly to the wheel. Major advantage of this design is said to be greater delivery of air in relation to the size, weight, power input and cost of the complete blower-motor combination.

Total weight of motor, including shaft, is only 12½ lb; diameter is 6 in., and width 4⅝ in. The motor does not add to the size of the blower. Compactness of the motor-blower combination, plus the fact that it can be mounted in any position, contributes to broader application and smaller over-all sizes of furnaces and air conditioners. The motor uses a new ventilation principle in which fan blades are integrally cast with end bells. Cooling air enters both ends of the motor near the shaft and is expelled through slots in the outer rim of each shield in harmony with the natural action of the blower. Cooling air does not pass through the precision air gap or other restricted air passages, it is noted. First production models of the motor are rated at ¼ hp, 1075 rpm, 115, 60 cycle. Electronics Div., Iron Fireman Mfg. Co.

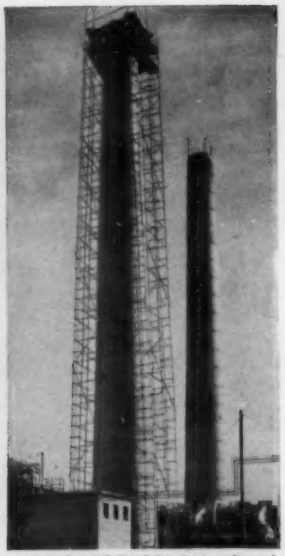
29—PORTABLE ELEVATORS, lift and dump

Designed for safe, efficient top-loading of tanks, bins, vats, hoppers and other receptacles, these skip elevators automatically lift and dump any free-flowing dry or liquid material from bags, drums, barrels and boxes. They are available in standard models to handle loads from 250 to 1000 lb, and special units to lift



MANY TYPES of repairing, painting and electrical work are easier and safer because of the extra working room and added stability of this 4'6"-wide Aluminum Ladder Scaffold. Available in 6', 8' and 10' spans. Base section is 6' high. Other heights by combining 4' and 5'4" units. Has safety 24" leg adjustment and rubber-tired casters. Approved by UL.

MACHINE REPAIR and other beyond-arm-reach maintenance is safely handled with a "Gold Medal" Platform Step-ladder. Workman stands on a firm, steady platform. Approved by Underwriters' Laboratories.



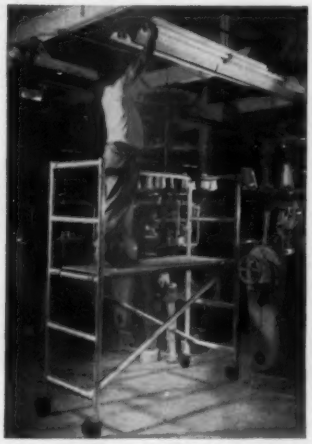
FIRE-SAFE TUBELOX® Steel Scaffolding has practically no size or height limitation—is widely used for construction and repairs. Easily erected on uneven terrain, it conforms to any contour.

How to Keep Costs Down On Overhead Work

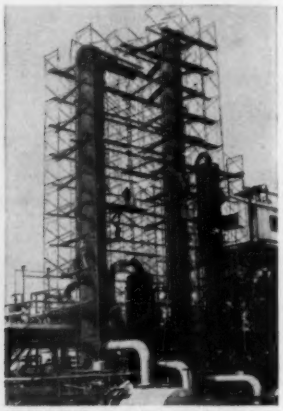
WHEN MAINTENANCE goes above floor-level the increased risks can be costly—in lives as well as dollars!—unless you provide efficient platforms that place men where they can work quickly, easily and safely.

Avoid trouble—use this safety check-list to match your equipment to each off-the-floor job: 1. Is work within ladder range? 2. Is there a wall for support or bracing? 3. Is area below work suitable for giving support? 4. Is frequent shifting of equipment necessary? 5. Must people and machines be under work area? 6. Will the scaffold or ladder carry the load?

You can keep overhead job costs and risks under control with Patent Scaffolding Co. Ladders and Scaffolds. PS can supply you with the right equipment for any off-the-ground work, because PS has the only complete line. That's why it pays to remember—when it comes to scaffolding, come to PS. Write for free bulletin G-205.

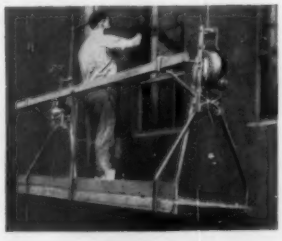


REPLACING FLUORESCENT lamps is a safe, fast job with Aluminum Ladder Scaffold. Ladder Frames come in 29 in. and 4 ft. 6 in. widths with 6, 8, and 10 ft. spans. Base Section is 6 ft. high. Other heights by adding 4 ft. and 5 ft. 4 in. units. 29 in. width is ideal for use in limited-space areas. Approved by UL.



"TROUBLE SAVER"® Sectional Scaffolding provides safe platforms for men working at Koppers Co. refinery, Port Acres, Texas. It is erected from pre-fabricated 5-ft frames. Approved by UL.

"GOLD MEDAL"® Junior Scaffolds are ideal for outside painting, washing windows and general medium-duty work. Available in steel or aluminum. 100 to 200 ft of cable. Raised by ratchet lever. Approved by Underwriters' Laboratories.



FOR GREATER SAFETY...EFFICIENCY...ECONOMY

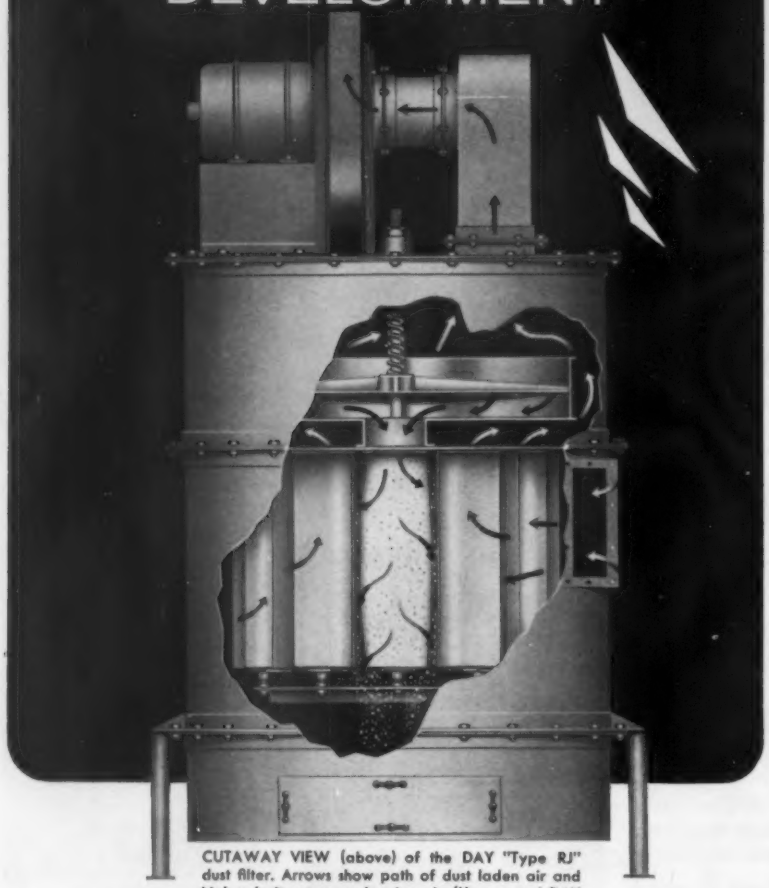
THE PATENT SCAFFOLDING CO., Inc.

38-21 12th Street Dept. PE Long Island City 1, N. Y.
Branches in all principal cities

To help you solve any scaffolding problem, PS offers a complete nation-wide engineering service—available locally. See the Yellow Pages in your 'phone book for the nearest Patent Scaffolding office or representative handling "Gold Medal" Scaffolds.

For more facts circle 594 on Reply Card

NEW DUST FILTER DEVELOPMENT



CUTAWAY VIEW (above) of the DAY "Type RJ" dust filter. Arrows show path of dust laden air and high velocity reverse cleaning air. (Hersey and DAY patents applied for.)

DAY "Type RJ" Dust Filter—First and Only Dust Filter to Offer All These Advantages

- An economical, high efficiency, automatic-continuous dust filter.
- Incorporates Hersey principle of high velocity reverse air for filter sleeve cleaning in a low cost unit.
- Provides efficiencies as high as 99.99+%.
- Automatic—continuous operation makes filter ideal for controlling dust created by continuous process equipment.
- Economical operation—utilizes ½ HP motor for filter sleeve cleaning.
- High air handling capacity for small space occupied by filter.
- Can be furnished for pressure or vacuum operation.
- Shipped completely assembled. Only piping and electrical connections required for operation.

The DAY "Type RJ" dust filter has many advantages to offer your plant. Get the complete facts, write toDAY for Bulletin 560.

75 YEARS DAY BUILDING INDUSTRY SINCE 1881

The DAY Company

807 Third Avenue N. E., Minneapolis, Minn.
IN CANADA: P. O. Box 70G, Ft. William, Ontario
Branch Plants: Buffalo, Ft. Worth, Toronto, Ontario
Representatives in principal cities

For more facts circle 595 on Reply Card

NEW PRODUCTS

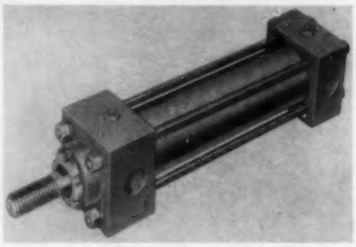
(Begins on page 136)

and dump heavier loads. Elevators with dump heights 10 ft or less may be equipped with ball-bearing casters and rigid-position floor locks; for fixed locations units can be designed to operate at almost any desired height.

A single electrical switch controls raising and lowering. After skip is loaded at floor level, it raises to full elevation, tilts 45 deg downward and stops there while load is discharged. Reversing the switch straightens the skip and returns it to floor for reloading. Spring-applied electric brake is provided to prevent load from falling when power is cut off. Unit can be converted for lifting purpose only. Models accommodate three types of material containers: bags to 24 in. in width; barrels and drums 18 to 34 in. high and to 25 in. diam; and a batch box with 8 cu ft capacity. Frederick T. Apted Co.

30—CYLINDERS, heavy-duty, non-rotating type

Ultra-mation Cylinders are non-rotating, double-acting, square-end cylinders — a type company built previously only as special for difficult high production jobs. Basic specifications include five bore sizes

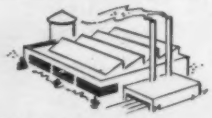


from 2 to 6 in.; pressures to 150 psi air to 500 psi oil; five basic mounting styles; front and blind end covers of heavy steel plate; heavy piston rods for high impact loads, with highly polished surfaces for minimum friction and maximum packing life; synthetic rubber rod wipers; corrosion-resistant cylinder tubes; steel pistons. Cushioning is available for either or both cylinder ends. Catalog 100-5-1 provides engineering data. Logansport Machine Co.

31—CAULKING COMPOUND of aluminum and rubber

Bits of aluminum in the form of microscopic, rolled flakes are interlocked with rubber to make Aluminum Rubbertex, a caulking compound described as having high durability and a glistening surface. The compound is being produced and marketed by Overall Paint and Lead Co., Inc. According to this company, Aluminum Rubbertex is geared in color and quality for use with aluminum doors, windows and other building materials and it gives a weld-like bond that blocks out moisture, air and sunlight.

Several caulking problems are reported overcome or minimized with this com-

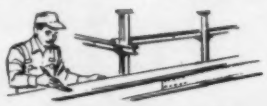


PROVED THROUGHOUT INDUSTRY FOR OVER THIRTY YEARS

Industrial leaders all over the world have used Rust-Oleum to stop and prevent rust for over thirty years. Rust-Oleum can do the same for your tanks, stacks, pipes, machinery, metal sash, wire fences, girders, etc.

RUST-OLEUM IS EXCLUSIVE

Rust-Oleum uses a specially-processed fish oil vehicle that penetrates rust to bare metal, dries right, and is free from objectionable odor. Accept no substitutes. Buy—and specify Rust-Oleum. You'll be happy that you did. There is only one Rust-Oleum—it is distinctive as your own fingerprint.



APPLY DIRECTLY OVER RUSTED SURFACES

Just scrape and wirebrush to remove rust scale and loose rust—then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust, usually eliminating costly surface preparations. Then—follow-up with your desired Rust-Oleum finish color.

MANY COLORS, INCLUDING ALUMINUM AND WHITE

You beautify as you protect, because Rust-Oleum finish coatings are available in practically all colors, including aluminum and white. They use the same basic rust-inhibiting vehicle as Rust-Oleum 769 Damp-Proof Red Primer and so provide double protection.

GREATER COVERAGE—EASY TO USE

Rust-Oleum is so easy to apply by brush or spray that one man can often do the work of two. Because of Rust-Oleum's easy-flowing qualities, an average of 30% more coverage is usually received—depending upon the type and porosity of the surface.

PRACTICAL ANSWER TO YOUR RUST-PRODUCING CONDITIONS

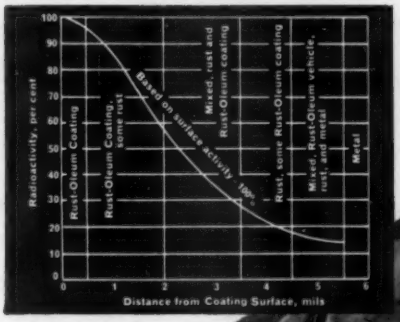
Rust-Oleum dries to a firm, decorative finish that resists salt water, heat, fumes, sun, steam, humidity, and weathering. Whatever your rust problem—you'll find Rust-Oleum the modern, practical way to stop rust.

Facts

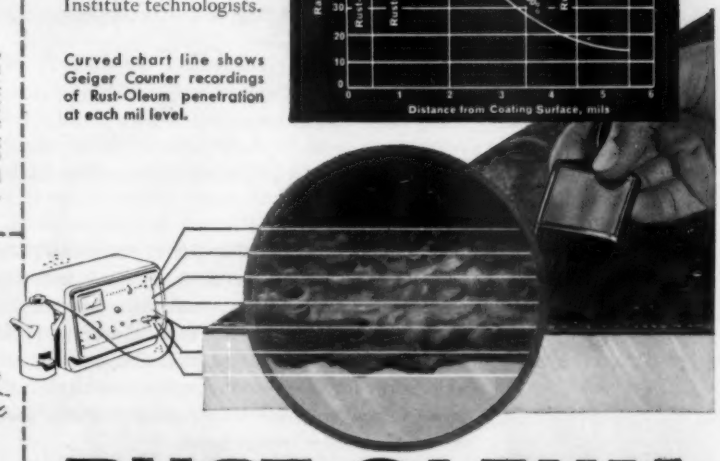
prove the economy of

RUST-OLEUM®

Geiger Counter traces Rust-Oleum penetration through rust to bare metal. The results of radioactive research prove that Rust-Oleum penetrates rust to bare metal. Rust-Oleum's *specially-processed* fish oil vehicle was radioactivated and formulated into Rust-Oleum 769 Damp-Proof Red Primer—then applied to rusted test panels. Geiger Counters then traced Rust-Oleum's *specially-processed* fish oil vehicle through the rust to bare metal. This penetration enables Rust-Oleum to be applied directly over sound rusted surfaces—usually eliminating costly surface preparations. Attach coupon to your business letterhead for your thirty-page report, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.



Curved chart line shows Geiger Counter recordings of Rust-Oleum penetration at each mil level.



RUST-OLEUM®

STOPS RUST!

See our Catalog in SWEETS, or write for complete information. Prompt delivery from Industrial Distributor stocks.

ATTACH TO YOUR LETTERHEAD—MAIL TODAY!

Rust-Oleum Corporation
2723 Oakton St.,
Evanston, Illinois

- ☐ Complete literature with color charts.
- ☐ Thirty-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.

For more facts circle 596 on Reply Card

How much

of your storage space has melted away due to old-fashioned handling methods?

TAKE FULL ADVANTAGE OF THE CUBE — STORE IN AISLE SPACE — TRAK-RAK **utilizes** aisle space—requires a very narrow aisle only 2 ft. greater than pallet size—revolves a full 360° to service both sides. Average industrial trucks must have 10 ft. to 12 ft. aisles for maneuvering and placing. **Make this extra aisle space, storage space!**

STORE CLOSE TO CEILING—TRAK-RAK stores within inches of ceiling —operates on overhead crane rails—utilizes maximum of cube—stable at all heights. The lift of average industrial truck is limited; the higher the lift, the more aisle space required and the less stable the load. **Make this waste upper space, storage space!**

TRAK-RAK IS 1-MAN PENDANT PUSH-BUTTON CONTROLLED from the floor, is 100% selective in placing and removing materials, and can be installed in practically any type of storage building without building alterations. Can be furnished as a self-contained unit running on top of the racks or as an underhung crane system. **Make use of ALL present storage space.**

WRITE FOR TRAK-RAK APPLICATIONS—a 20 page illustrated booklet explaining in detail TRAK-RAK Handling and Storage Systems and giving complete information on 14 widely different TRAK-RAK Installations.

CHICAGO TRAMRAIL CORPORATION

1324 SO. KOSTNER AVENUE • CHICAGO 23, ILLINOIS

For more facts circle 597 on Reply Card

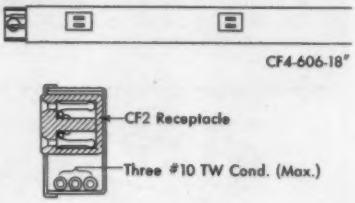
NEW PRODUCTS

(Begins on page 136)

bination aluminum and rubber: longer life, added adhesion, a soft pliable compound, and extra oil retention without oil-bleed or sag. It is offered in both metal and fiber cartridges which fit standard bail-type, drop-in and combination guns. Aluminum Co. of America.

32—ELECTRICAL STRIP takes branch circuit wires

Type CF-4 Plug-In Strip has an integral raceway to handle branch circuit conductors in addition to its standard use in providing electrical outlets. It was developed to meet the need for a method of running branch circuits, 110- and 220-v



service in the same duct carrying regular Plug-In Strip harness. These provisions are designed to make possible a normal Plug-In Strip installation with the capacity to handle additional single-phase and three-phase load within the limits of No. 10 conductors.

UL approval is reported for installing up to three No. 10 Type TW electrical conductors in the raceway space beneath the standard Plug-In Strip assembly. The additional conductors, in accordance with the Electrical Code, may be wired either three-phases or single-phase, says company. A ¾-in. knockout at each end of a 6-ft strip allows in-and-out accessibility of additional branch circuit wires without special feed fittings. Declared particularly adaptable for air-conditioning unit installations, the Type CF-4 is available with standard two-wire or grounded type receptacles every 6 or 18 in. National Electric Products Corp.

33—POTENTIOMETER features simple circuitry

Announced as having the simplest possible circuitry, the American-Microsen Transmitting Potentiometer has only two vacuum tubes. It is designed to permit measurement and control of low voltage while drawing negligible current from the source. It is available as a thermocouple pyrometer or to measure d-c output of electrical transducers. No slidewires, batteries, standard cell, chopper or converter are used—input voltage is automatically balanced against output signal by company's Microsen balance, which also serves to maintain a constant reference voltage supply.

The transmitter is available in ranges from 6 to 50 mv (200 F and up), with

Western Electric Company and Pacific Telephone and Telegraph Company Building, San Leandro, California.
Harry A. Thomsen & Aleck L. Wilson, Architects • Swinerton & Walberg Co., Contractor • East Bay Glass Company, Glazier

Coolite Glass Keeps Production in Better Sight in New California Supplies Center of Pacific Telephone and Western Electric

Mississippi's Coolite wire glass, used in this modern plant, keeps work areas and offices literally loaded with daylight . . . provides plenty of conditioned, natural illumination for easier seeing, greater comfort and added safety. For Coolite, Heat Absorbing, Glare Reducing glass permits use of vast areas of glass without distracting, discomforting glare . . . absorbs up to 50% of solar heat rays to eliminate unwanted heat. The attractive Luxlite pattern diffuses softened daylight deep into interiors, avoids harsh shadows and sharp contrasts. Workers see better, feel better, work better in Coolite-conditioned daylighting. Brighten your production picture with Coolite. When you build or remodel your facilities, consider Coolite. Find out how Coolite, Heat Absorbing, Glare Reducing glass can keep costs down, boost employee efficiency, lighten load on humidification and air conditioning equipment.

Write for free catalog.
Address Dept. 13.

Translucent, light diffusing glass by Mississippi is available in a wide variety of patterns and surface finishes, wired and unwired, all "visioneered" to meet any daylighting requirement. Available through leading distributors of quality glass everywhere.

Sweet's

MISSISSIPPI Glass COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.
NEW YORK • CHICAGO FULLERTON, CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

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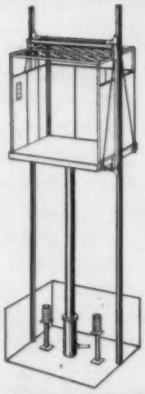
Most practical elevators for rises up to 55 feet

ROTARY OILDRAULIC® ELEVATORS need no penthouse or heavy sidewalls

Save up to 25% on elevator costs—Oildraulic Elevators are designed for low-cost installation and economical, trouble-free operation. No penthouse or heavy load-bearing shaftway structure needed... powerful hydraulic jack supports car and load. Rugged car construction withstands shocks and jolts of power truck loading. Automatic floor leveling within ¼" guaranteed, regardless of load size or rate of speed. Car sizes, capacities and controls as required.

Over 100,000 Oildraulic Elevators and Lifts are now in use. Rotary's coast-to-coast field organization provides prompt, efficient installation and service. Mail coupon below for catalogs.



MAIL NOW FOR NEW ELEVATOR CATALOGS

Rotary Lift Co., 1119 Kentucky, Memphis 2, Tenn.

Send catalog on ☐ freight ☐ passenger elevators to:

Name_____

Address_____

City_____ State_____

Rotary®

OILDRAULIC® ELEVATORS

For Freight or Passenger Service

For more facts circle 599 on Reply Card

NEW PRODUCTS

(Begins on page 136)

zero suppression up to five times the span. High sensitivity—reported better than 3 microvolts — permits accurate control of temperatures, company notes, when used with electronic control system. An output of 0.5 to 5.0 milliamperes d-c is produced, which can be transmitted over distances up to 30 miles. Manning, Maxwell & Moore, Inc.

34—SOLDER FLUX with double action feature

Fas-Tin is announced as a solder containing flux with a dual action that makes a solder job possible where it is impossible to clean adequately. It applies like butter. To solder any metal the surface oxide must be suspended by the chemical action of the flux, it is explained, and this causes residue. When dirt from uncleaned

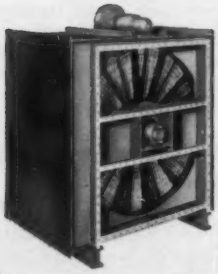
metal surfaces is added a further barrier is set up for the solder to penetrate. Fas-Tin is claimed to overcome this dirt and residue with its dual action: First, the chemical treatment results in the forming of an envelope around each particle of powdered solder; and second, the solder is then suspended in a powerful scavenger flux. Under heat a double-barreled action results. The flux cleans the dirt and suspends the surface oxide, says manufacturer; the envelope around the solder particles lowers the surface tension of the solder and metal to which it is applied. This releases a rain of solder particles to coat the metal uniformly with a bond of great strength. Fas-Tin is intended for use on all metals, except aluminum. A 2-lb can costs about $4.00. Farrelloy Co.

35—DUAL STAPLER closes carton from outside

The Dual Stapler is designed for simultaneously stapling tops and bottoms of the average carton in less than 3 sec. It weighs less than company's previous model, costs less, and, the two-cycle motor operates on 60 lb air pressure. Stapler features two stapling heads using retractable anvils that allow simultaneous top and bottom closing after cartons are filled. Penetration control regulates depth of staple leg, to prevent damage to contents regardless of type of flute used in corrugated cartons. A tamper proof clinch control can be adjusted for perfect

in one package

big-unit fuel economy for small boilers!



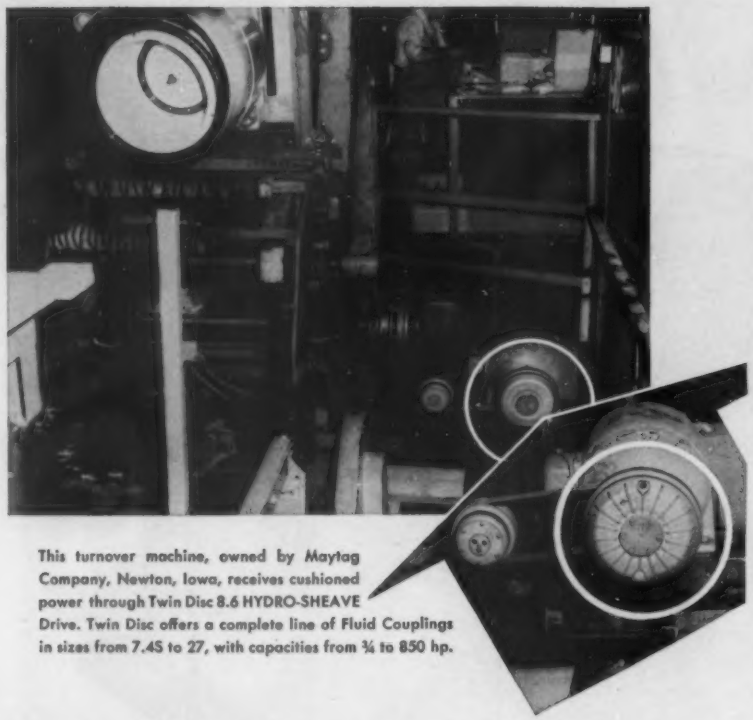
That's the way you receive the Package Ljungstrom. The entire self-contained unit arrives fully-assembled and ready for installation.

Now, with the Package Ljungstrom® Air Preheater, even boilers as small as 25,000 pounds of steam per hour can operate at big-unit fuel efficiencies. Compact and self-contained, the packaged unit operates in the same way as the larger Ljungstrom units so widely used by large industries and utilities—waste heat is absorbed from flue gas by the rotating surface . . . transferred to incoming combustion air by the same surface . . . and funneled back to the furnace—reducing your fuel costs 1% for every 45-50° of preheat.

Find out how the efficient, low-cost Package Ljungstrom Air Preheater can be applied to your steam-generating units. Write, today, to The Air Preheater Corporation.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

For more facts circle 600 on Reply Card



This turnover machine, owned by Maytag Company, Newton, Iowa, receives cushioned power through Twin Disc 8.6 HYDRO-SHEAVE Drive. Twin Disc offers a complete line of Fluid Couplings in sizes from 7.4S to 27, with capacities from ¾ to 850 hp.

Fluid Drive eliminates MOTOR BURN-OUTS

The Maytag Company, one of the nation's leading home laundry equipment manufacturers, recently had the *annoying and expensive* problem of frequent motor burn-outs on a turnover machine in the assembly-line manufacture of washing machines.

Because of a large number of reversals per hour, the 5 hp, 1750 rpm motor could not cycle fast enough to keep pace with stepped-up conveyor lines. To solve this problem, a Twin Disc 8.6 HYDRO-SHEAVE® Drive was installed on the motor.

Now, automatic fluid "slip" *absorbs* the shocks and overloads—and there have been *no* motor burn-outs. The fluid drive also eliminated the need for an extra friction brake. In addition, the HYDRO-SHEAVE has permitted conversion from flat belts to V-belts—making faster cycling possible. And the reversing operation is more than able to keep up with the conveyor lines.

The Twin Disc HYDRO-SHEAVE provides *cushioned* drive—with a *smooth, steady* flow of power. And it smooths *out* shock loads — protecting *both* driving and driven equipment. For complete information, write Twin Disc, Dept. DS, Racine, Wisconsin, *today*. Request *new* HYDRO-SHEAVE Bulletin 145-C.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC
Fluid Couplings

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Tulsa

For more facts circle 601 on Reply Card

NEW PRODUCTS

(Begins on page 136)

closure. Steel staples seal all standard corrugated and fibreboard cartons—it will seal A, B, & C flute corrugated, up to 350 lb double wall cartons, and standard thicknesses of solid fibreboard cartons. Closures made with stapler are said to meet general freight classification and parcel post regulations. Stapler can be used on center slotted, partial overlap, full overlap, and other types of containers. International Staple & Machine Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 201-202. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

36—X-RAY UNIT aids in weld inspection

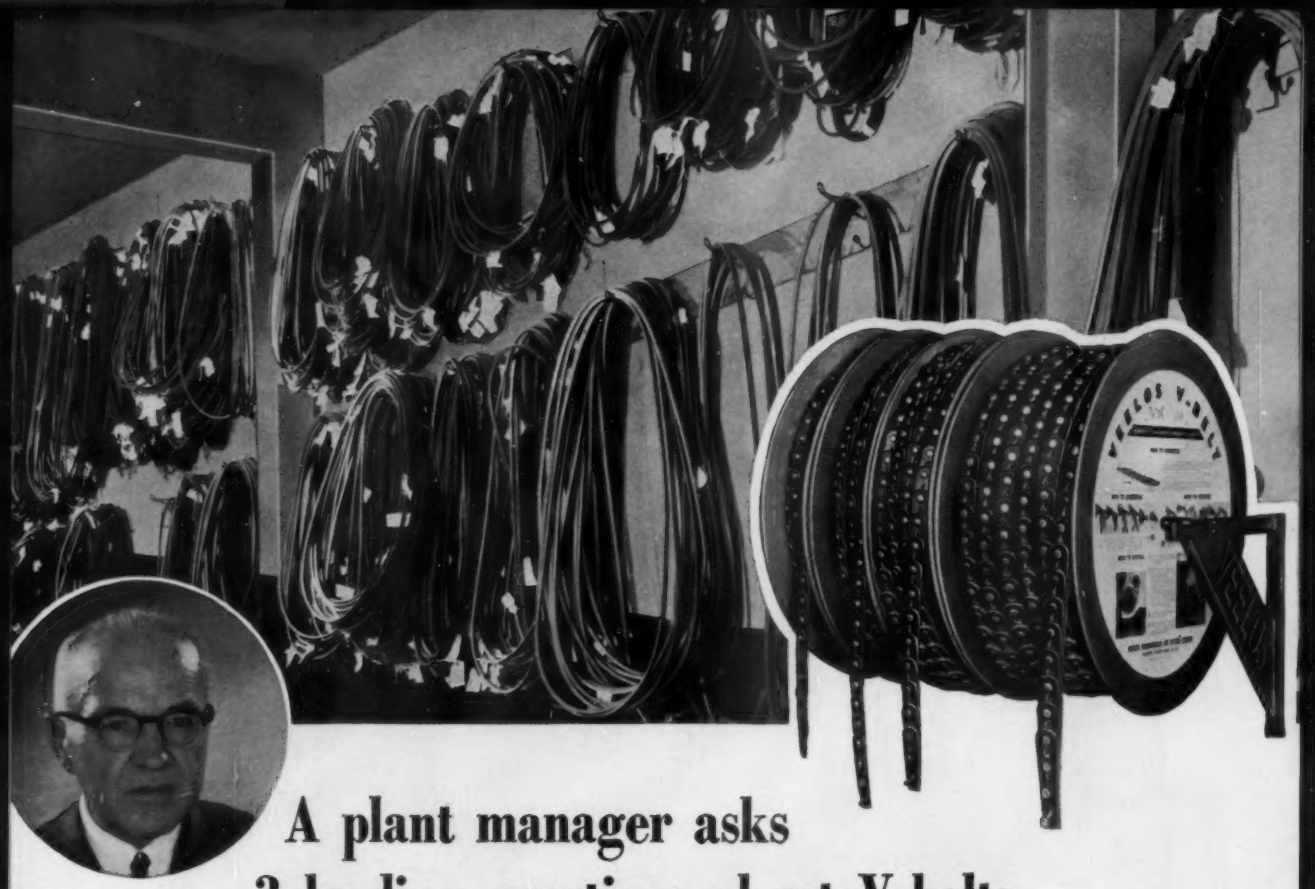
Basic design feature of the Baltospot is its low weight-to-power ratio. Described as the lightest unit available for its rating, the X-ray head weighs only 46 lb and provides a power penetration of 140 kvp. The entire unit, which comprises the X-ray head and control panel, fits inside a trunk 32-by-16-by-13½ in. It provides spot-check radiographs up to a capacity of 1½-in. steel or the equivalent. It is intended for use in place of, or as an alternative to sectioning methods of weld inspection. Balteau Electric Corp.

37—PRESSURE SWITCH can be set without gages

Pressure Switch C9612 has a calibrated plate which enables visual setting of the switch before or after installation on a pressure line. An indicator inside the switch is visible through a window in the plate. By means of an external adjustment screw, the indicator can be lined up with the desired pressure on the plate. Then, when the desired pressure is set, the screw can be locked in place. This switch is designed to sense any system pressure over an adjustable range of 15 to 3000 psi; the particular range may be covered by one of four classes of switch. The fixed actuation value varies from 10 to 250 psi, depending on setting. Barksdale Valves.

38—INSULATION WRAPPER of heavy cotton cloth

Vycot is designed to cover heat insulation on piping and protect it from deterioration by weathering, sunlight, moisture and chemical action. It is fabricated with a heavy weight cotton cloth, heat treated with chemically resistant resins.



A plant manager asks 3 leading questions about V-belts

1 "I stock 85 different sized sets of belts—how can Veelos help me?"

With *four* 100′ reels of Veelos (O, A, B, C widths) you can replace as many as 316 different sizes of endless belts —and store your Veelos in *inches of space!* Veelos cuts your inventory to a minimum. No obsolescence or deterioration, no worries about specific sizes. With Veelos, your storage and inventory problems are licked!

2 "How does Veelos cut installation and down-time?"

Veelos is an *adjustable belt.* With Veelos, there's no tearing down outboard bearings, no resetting, tilting or moving motors to make belt replacement or repairs! And you don't have to replace a complete matched set because of one loose belt—Veelos belts adjust to any length, can be altered by adding or removing links!

3 "How do I eliminate costly belt vibration?"

Install Veelos in place of ordinary belts! Veelos belts are absolutely uniform; every stud and link is identical; every foot of the reel is identical and uniform; they're perfectly balanced. Your Veelos salesman can easily prove to you with a Veelos Vibration Analyzer (tested against any V-belt you might now be using) that Veelos *cuts vibration up to 90%!*

VEELOS
THE BALANCED
LINK V-BELT

Veelos is known as Veelink outside U.S.A.

Get your free Veelos Data Book; many pages of important information on belt drives. Write to:

MANHEIM
Manufacturing & Belting Company
104 Stiegel St., Manheim, Pa.

"Industrial Belt Specialists Since 1911"

© M.M.&B. Co. 1956

Adjustable to any length • Adaptable to any drive • Balanced power • Constant power • Vibrationless power

For more facts circle 602 on Reply Card

Choose This RUGGED COLSON TRUCK for your roughest, toughest handling jobs

The COLSON Push E-Z Truck

is a heavyweight champ that takes any beating you can give it and comes back for more. It's the strongest hand truck ever built. Capacity with metal or molded plastic wheels, 6000 pounds; with rubber-tired wheels, 3000 pounds. Platform is of steel or selected hardwood.

Despite its unusually heavy, rugged construction, comparative tests show that this truck, fully loaded, starts and rolls with but slightly more than half the effort required to move the average factory truck.

COLSON ForgeWeld Casters

Here's the world's finest caster for extra heavy duty requirements. Wheels of cast steel, iron, rubber or molded plastic in capacities up to 6000 pounds per caster.

Equip your shop trucks with COLSON ForgeWelds, and your caster replacement problems are over.

Whether you are interested in a fleet of factory trucks or one set of replacement casters, it pays you to call on COLSON — maker of the country's most varied line of quality materials-handling products.

Write us for free booklet on COLSON materials-handling equipment, or better still, look in the yellow pages of your local phone book (under "Casters" or "Trucks — Industrial") for the COLSON office near you.

CASTERS • HAND TRUCKS • LIFT JACK SYSTEMS
HYDRAULIC, ELECTRIC AND MECHANICAL POWER LIFTS
AND TRANSPORTS

THE Colson® CORPORATION
Elyria, Ohio

For more facts circle 603 on Reply Card

For more facts circle 604 on Reply Card →

Film censor at work

At 950-acre Kodak Park, the film-producing plant of Eastman Kodak Co. in Rochester, N. Y., they take no chances on film contamination.

For example, in the operation shown here, a red-wheeled Aloyco stainless steel valve rules out of the picture dangerous rust and iron contaminants which would spoil the thick fluid which is called "dope." These valves control the flow of dope onto roll-coating wheels, where solvents are driven off with heat. The dry film base is then readied for the final coat of emulsion.

Today thousands of industrial processes are being safeguarded by Aloyco corrosion and contaminant resistant valves. Find out why their dependable performance makes them first choice for all types of vital flow lines. Write Alloy Steel Products Co., Inc., 1301 West Elizabeth Avenue, Linden, N. J.

Subsidiary of Walworth Company

THINKING of REVISING YOUR PLANT LAYOUT?

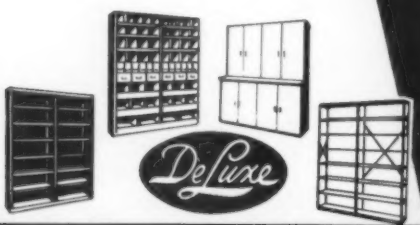
(Then How Can You Settle For Less . . . When The Best Costs No More)

Write For This Big 48-Page DeLuxe Reference Manual. Ask For Details Of Our "PLANT LAYOUT SERVICE", Yours Without Obligation.

ANOTHER GOOD REASON WHY YOU SHOULD CONSIDER DeLuxe

Factory imbedded shelf reinforcing eliminates countless installation hours of bolting-in conventional shelf reinforcing in the field. DELUXE does this job for you!

It certainly isn't difficult to see how DELUXE steel shelving saves you needless expense and set-up headaches right up and down the line. Special components are designed to make the erection almost child's play . . . units to fit any operation now, or later are built to your specific plant layout. You are not plagued with a lot of "extras"; a DELUXE installation is *complete*. Heavy gauge materials . . . throughout. DELUXE shelving is *fully* finished. Without reservation, you have protected your shelving investment for *all time* with DELUXE. Comparison will prove there's no "double talk" here!



DELUXE METAL FURNITURE COMPANY
WARREN, PENNSYLVANIA

A DIVISION OF THE ROYAL METAL MFG. CO.

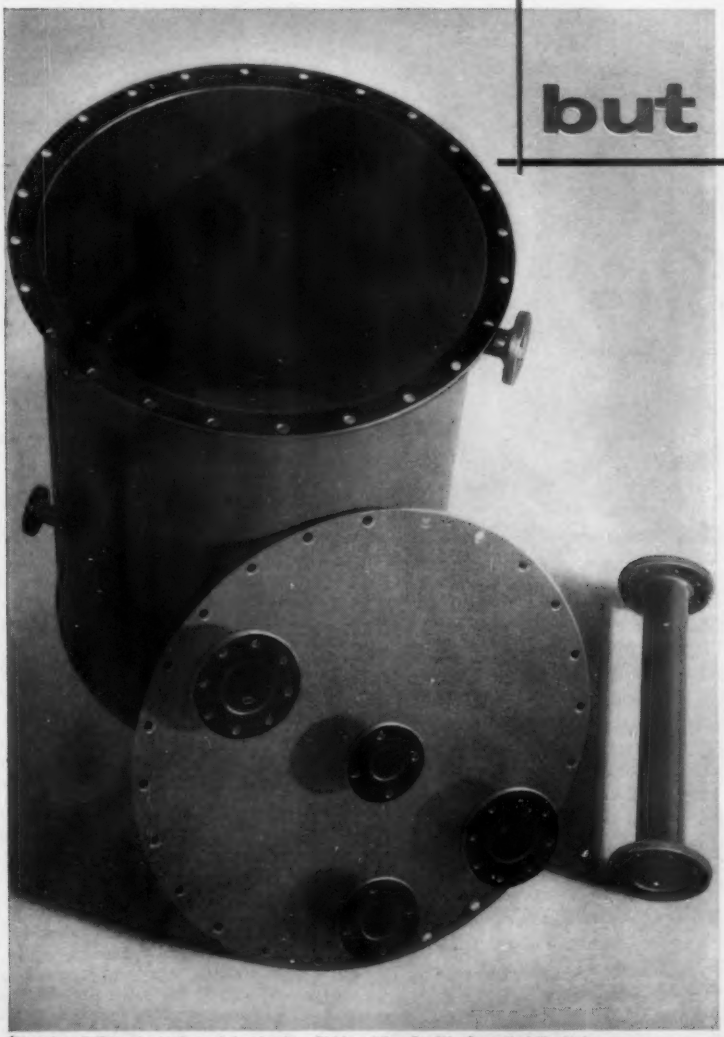
Manufacturers of "Verti-File", "Templa-File", and quality factory furniture for over a quarter of a century.

THERE IS A DeLuxe FACTORY TRAINED REPRESENTATIVE AS NEAR TO YOU AS YOUR TELEPHONE.

For more facts circle 605 on Reply Card

INDUSTRY'S MOST SHOCKING WASTE...

CORROSION COSTS EQUAL 25% OF NET PROFITS!



but

MURRO makes corrosives harmless with VYFLEX L-10!*

PORTSMOUTH, VA. To make an extremely powerful industrial bleach, Murro Chemical Co. combines caustic soda and chlorine. Ordinarily, these could corrode any metal tank *fast*—but not at Murro. Designed by Amroc, Inc., New York, costly tanks 4′ high, 3′ in diameter, are lined with low cost VYFLEX L-10, made from EXON 900 series resin. Interior surfaces, inlets, outlets and flange connections will never know corrosion.

You can stop corrosion!

EXON PVC resins are engineered specifically to wipe out specific corrosion problems. They are the bases for a wide variety of lightweight structural rigids, linings, coatings, pipes and fittings. To stop Industry's most shocking waste, call:

Firestone

EXON®

CHEMICAL SALES DIVISION

FIRESTONE PLASTICS CO., Dept. 615-D, Pottstown, Pa.
A Division of the Firestone Tire and Rubber Company

*Made from EXON resins by Kaykor Industries, Inc., Division of Kaye-Tex Mfg. Corp., Yardville, N. J.

For more facts circle 606 on Reply Card

SAFE HANDLING REQUIRED

When white-hot molten steel is poured, only the finest quality products are specified to insure absolute safety. The wire rope lines that control movement of the ladle above are secured with genuine Crosby Clips. Easily recognized by the famous Red-U-Bolt, genuine Crosby Clips are drop-forged and hot-dip-galvanized for maximum wearing ability. The safest clip sold, genuine Crosby Clips are specified for safety in more plants than any other drop-forged rope fasteners. A complete range of sizes ⅛″ to 3″.

STRONG AS 3B CHAIN

Added safety is given to men and equipment using repaired steel chains with genuine Laughlin "Missing Links". As strong as 3B chain, Laughlin "Missing Links" are drop-forged from special forging steel, heat-treated, and matched under pressure for a perfect fit. Available in a complete range of sizes 3/16″ to 1⅜″ at distributors everywhere.

HANDLES 4 CHAIN SIZES

Four different clevis hook sizes can be interchanged instantly on Laughlin's new Load Binder—industry's safest and strongest. Laughlin's Load Binder with 20-inch handle takes Laughlin Clevis hook sizes ¼″, 5/16″, ⅜″ and 7/16″. The 22-inch Load Binder takes ⅜″, 7/16″, ½″ and ⅝″ sizes. Extremely strong, Laughlin Load Binders won't spread even under heavy strain because the swivel tongue swings *within* the handle-end slot, and the clevis is on the trunnion.

PERFECTLY ALIGNED

Safer performance and far greater strength are obtained with Laughlin shackles because the pin holes are drilled—assuring perfect alignment. Made of special forging steel throughout, the pins are heavier and stronger than the shackle itself to prevent shearing due to shifting or shock loads. Weldless and drop-forged, famous Laughlin "Perfectly Aligned" shackles are available in a complete range of sizes from 3/16″ to 3″ at distributors everywhere. For free catalogs on the complete Laughlin and Crosby lines, write the Thomas Laughlin Division, Portland, Maine, or the Crosby Division, American Hoist & Derrick Co., St. Paul 1, Minnesota.

NEW PRODUCTS

(Begins on page 136)

The material is described as homogeneous and dimensionally stable for protecting insulation indoors and out. Being flexible, Vycot is easily handled and installed; company says it conforms to all sizes and shapes and offers an excellent vapor barrier to moisture, chemical fumes and spills. Its finish and resistance is also claimed unaffected by bacteriacide washes commonly used in hospitals and food processing plants. The material comes in standard colors of aluminum, red, gray, yellow and green, but special colors are available. Vycot can be sewn or cigarette wrapped around piping surfaces. A fast drying bonding cement is supplied by manufacturer for this purpose. Vycot comes in 75-yd rolls, 54-in. wide. The Industrial Laminates Div., Fabric Distributing Co.

39—PIPE HANGERS with load capacities to 32267 lb

Incorporated in an extended line of Model R Constant Support Hangers are most sought for features in pipe suspension, says manufacturer. These hangers are designed to permit expansion and

contraction of piping systems, through heating and cooling cycles, without developing dangerous stresses. As explained, this new line offers increased supporting forces or greater travel within a given frame size to provide any load or travel required. Capacities range from 31 to 32267 lb and there are nine frame structures available—two of them new. Field adjusting bolts have been relocated for easy load adjustment. Bearings have been relocated in the frames to permit the main pivot to rotate and carry the load indicating pointer. Four of the new designs require less headroom, permit installation closer to other structures. Grinnell Co., Inc.

40—FAUCET RESEATER is simple and easily used

The Alert Faucet Reseater can't damage faucets and automatically assures alignment, says manufacturer, and it can be used by anyone. It fits valve sizes 00 to ½ L. The reseater comes equipped with

For more facts circle 607 on Reply Card

Material is sucked from the intake hopper a distance of 140 feet to this roof-top Airstream receiver. Here it is collected and gravity-fed into slurry tanks below.

A unique Airstream intake hopper, designed specially for the Lilly installation, slits the bags and introduces the material into the conveying line. A hood above the hopper prevents spread of dust. As an added convenience it may be rolled into a nearby boxcar for direct unloading.

At Eli Lilly's new Tippecanoe Laboratories . . .

another "problem" material conveyed economically by Airstream

Dry materials become "problem" materials when they require special handling precautions. For example, some chemicals must be kept contamination-free; all foods must remain pure; fragile materials must not be powdered or crushed. Hundreds of these "problems" have been solved by Dracco—with the materials handled swiftly and economically by Dracco Airstream Conveyors.

An example of a Dracco-engineered solution for handling such materials is the Airstream system used by Eli Lilly & Company at the ultra-modern Tippecanoe Laboratories in Lafayette, Indiana. Here, a friable filter aid, purchased in bags, is delivered directly to process at 7½ tons per hour from the warehouse.

A special Airstream technique protects the material against breakage which would destroy its effectiveness. The self-cleaning action of the system eliminates maintenance problems and permits instant change-over to other materials without intermixing. Fast, one-man operation cuts costs, absence of dust avoids housekeeping and contamination problems.

If you have a problem in handling dry materials, investigate the advantages of Airstream conveying with its many cost-saving features. Explain your situation to Dracco—we'll do the rest. Write or call today.

DRACCO CORPORATION
4035 East 116th Street • Cleveland 5, Ohio

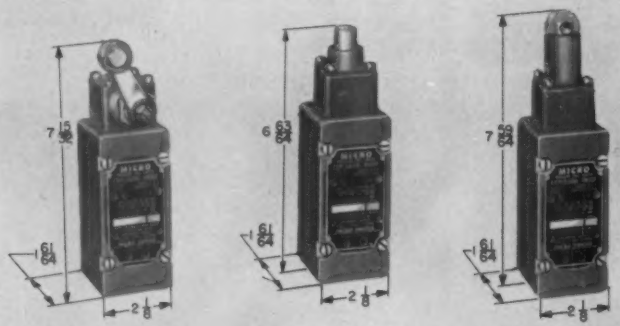
FREE! THE DRACCO ENGINEER. Describes Dracco solutions to many bulk materials handling and dust control problems . . . includes tips on improving plant efficiency . . . published quarterly. Get on the mailing list. Write on your letterhead today!

DRACCO *Performance Proved*
Airstream **CONVEYORS · DUST CONTROL EQUIPMENT**

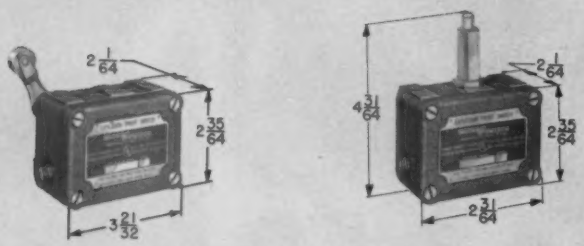
For more facts circle 608 on Reply Card

MICRO *precision switches*

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN



MICRO SWITCH heavy duty explosion-proof switches. Roller arm actuated (left), plunger-actuated (center) and roller plunger-actuated (right).



Explosion-proof switches with wide variety of mounting arrangements. Roller arm-actuated (left), plunger-actuated (right).

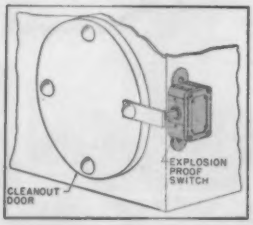
These reliable switches are insurance against many types of plant fires and explosions

MICRO explosion-proof switches are ideal electrical controls in flammable areas. They combine the ability to operate safely in explosive gas or vapor-air atmospheres with the desirable features of precise operation, accurate repeatability, small size, easy adjustment and durable construction. They are the most compact explosion-proof switches available.

MICRO explosion-proof switches are widely used in such hazardous atmospheres as those found in chemical plants, refineries, flour mills, coal mines and metal processing plants. They are Underwriters' Listed as suitable for use in hazardous locations Class I, Group C (atmospheres containing ethyl-ether vapor) and D (atmospheres containing gasoline, petroleum naphtha, alcohols, acetone, lacquer solvent vapors and natural gas); Class II, Group E (metal dust), Group F (carbon black, coal or coke dust) and Group G (grain dust).

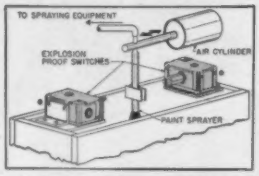
These switches are ideal components for installation on present plant equipment to make it safer, more automatic and more productive. MICRO precision switches are sold by distributors in key cities everywhere. Look under "Switches, Electric" in the yellow pages of your phone book.

As Incinerator Safety Interlock



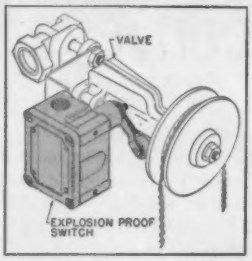
A snap-action explosion-proof switch on an oil or gas-fired incinerator prevents ignition of the fuel while the unit is being cleaned or repaired. The switch is held operated when the door is closed. Opening the door releases the switch actuator which prevents starting the ignition transformer.

Controls Automatic Paint Sprayer



Two switches speed up painting of parts and automatically shut off the spray gun at the end of each operation. When arm leaves the air cylinder, Switch "A" is released, starting the spray gun. Contact with Switch "B" turns off the spray. The painted part is removed and the operations repeated.

Control for Remote Valve



Explosion-proof switch notifies operator of the position of the disc in a remotely located valve. The valve, which contains a flammable liquid, is controlled from the floor below by means of a chain-operated wheel. The roller arm actuator is operated by the rim of the chain wheel. It is wired to a set of panel lights which indicate the disc position of the valve.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

For more facts circle 609 on Reply Card

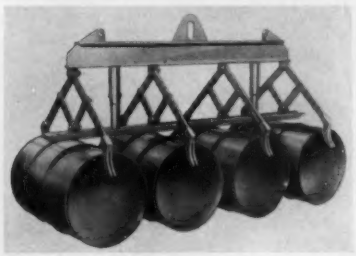
NEW PRODUCTS

(Begins on page 136)

three back up plates (¼, ⅜ and ½ in.) and three abrasive cloth discs of corresponding size. Use of the tool does not require removal of the faucet handle, bonnet nut or packing from the stem. According to company, the abrasive discs are waterproof and provide a smooth finish on the valve seat, and without risk of cutting too deep or leaving cutter marks. The new tool will cost less than a dollar. Ardmore Products Co.

41—DRUM LIFTER handles 3 to 6 drums at a lift

When your drums are laying down on the job—one man can handle them faster and easier, it is announced, with this horizontal drum lifter. The automatic grab handles from three to six drums



with each lift, making handling and storing of drums a fast, easy job. To pick up a load, the grab is spotted over the drums and lowered until hooks engage drum ends. To release the drums, grab is lowered until center bar forces hooks open—a short end movement of grab moves hooks so the drum lifter may be hoisted clear of the drums. No extra helpers are needed says company—one man handles the whole operation. Downs Crane & Hoist Co.

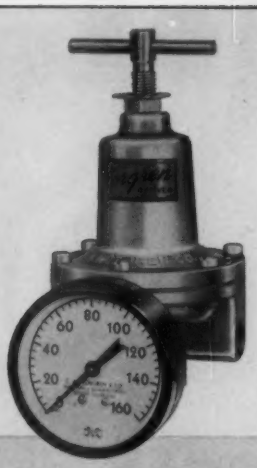
42—CENTRIFUGAL SEPARATOR for dust, fly ash

This multi-tube collector consists of an inlet chamber connected directly to a nest of vertically-mounted separating tubes, a dust-collecting hopper, and a clean gas discharge chamber. According to company engineers the design of inlet head and guide vanes make this collector different from other types and accounts for high separation efficiency. Dust laden gases enter the collector at velocities sufficient to keep fine dust particles suspended. Cleaned gas goes out the stack, it is explained, and practically all dust stays in the hopper.

Shape of inlet head and design of the guide vanes of each collector cause the gas to whirl in the space between inner and outer shell of the tube, throwing out more of the trapped dust particles. The cleaned gas, still whirling, flows down along the length of the tube and then moves up and out through the inner shell. Dust particles, forced to the outer

NORGREN
AIR PRESSURE REGULATORS

Accurate, Dependable Control of Air Pressure



There's a Norgren Regulator for Every Air Regulation Need.

All air-operated equipment is designed to operate most efficiently at one specified air pressure. Pressures in excess of this specified pressure result in greater wear, more down-time, higher maintenance cost and waste of air. You can select a Norgren Regulator that will provide the desired pressure at all times, holding it constant even though the line pressure or rate of flow may vary.

How Norgren Regulators Provide Accurate, Trouble-Free Service...

1. PRECISION CONSTRUCTION
Norgren Pressure Regulators are precision built throughout to provide accurate pressure regulation under the most rugged conditions.

2. PRESSURE KEPT CONSTANT
Norgren Pressure Regulators respond quickly to sudden demands for greater air volume without an excessive momentary pressure drop.

3. EFFICIENT OPERATION
A baffle plate and siphon tube permits greater air flow with less pressure drop and protects the diaphragm against sudden pressure surges and chatter.

4. LONG-WEARING DIAPHRAGM
The diaphragm in Norgren Pressure Regulators is made of oil-resistant synthetic rubber reinforced with nylon fabric.

5. RELIEVING FEATURE
The built-in relieving feature available on all models safeguards connected equipment against damage through pressure surges—permits downward adjustment of pressure without auxiliary "bleeding" of line.

6. EASY TO INSTALL
Pipe connections are straight through for easy installation. In addition, most models can be completely dismantled without removing them from the air line.

Without obligation, learn how Norgren Pressure Regulators can reduce costs in your plant. Call your nearby Norgren Representative listed in your telephone directory, or **WRITE THE FACTORY FOR NEW NO. 700 CATALOG.**

C.A. Norgren CO.

3443 So. Elati St., Englewood, Colo.

Wherever Air is Used in Industry

NEARLY 400 STANDARD MODELS

NORGREN AIR PRESSURE REGULATORS, RELIEVING

Relieving feature provides added protection against excessive pressure build-up. Permits downward adjustment of pressure without "bleeding" of line. Maximum allowable primary pressure is 450 psi; adjustable delivery pressure is 2 to 250 psi. Pipe sizes—⅛" to 1" inclusive. Series 2AX.

NORGREN AIR PRESSURE REGULATORS, STANDARD

Maximum allowable primary pressure is 450 psi; adjustable delivery pressure is 2 to 250 psi. Pipe sizes—⅛" to 1" inclusive. Series 2A.

NORGREN AIR PRESSURE REGULATORS, PRECISION

For precise control of air pressure in the range of 0 to 2 cfm. Specially suited for use with air-controlled instruments. Maximum allowable primary pressure is 400 psi; adjustable delivery pressure is 1 to 30 psi. Relieving type. Pipe size—¼". Series 11,400.

NORGREN AIR PRESSURE REGULATORS, PILOT-CONTROLLED

A precisely controlled air cushion provides an extended adjustable range, more accurate pressure regulation, increased capacity in cfm. Maximum allowable primary pressure is 400 psi; adjustable delivery pressure is 2 to 120 psi. Pipe sizes—½", ¼", 1". Series 20AA.

For more facts circle 610 on Reply Card

Over 2000 COCHRANE CONDENSATE RETURN SYSTEMS . . . cut costs and set new standards of production wherever steam is used for heat transfer. C-B type shown right was installed by a chemical manufacturer on a dryer for titanium dioxide. Production rose from 45 to 65 tons a day . . . a gain of 30%! Steam consumption decreased from 12,000 to 7,000 lbs/hr—reducing steam cost 40%!

Cochrane "Jet Pump"

C-B CONDENSATE RETURN SYSTEM

assures maximum production efficiency

Here is a method of improving heat transfer from steam that is almost unbelievable! In one plant alone, installation of a Cochrane C-B System increased production in pressure kettles by 50%, decreased steam costs 15%, and in addition produced a finer, more consistently uniform product.

Regardless of the type of system now employed, a Cochrane C-B System is *guaranteed* to get more heat from your steam. The system prevents "condensate blanketing"—returns condensate continuously to boiler or make-up system without appreciable loss of heat.

Insure peak operating efficiency of your steam process equipment today by investigating the advantages of a Cochrane C-B System . . . Write for Publication No. 6025.

Cochrane
CORPORATION

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Representatives in 30 principal cities in U.S.; Toronto, Canada; Paris, France; La Spezia, Italy; Mexico City, Mexico; Havana, Cuba; Caracas, Venezuela; San Juan, Puerto Rico; Honolulu, Hawaii.
Pottstown Metal Products Division—Custom built carbon steel and alloy products

Demineralizers • Hot Process Softeners • Hot Zeolite Softeners • Dealkalizers • Reactors
Deaerators • Continuous Blowoff Systems • Condensate Return Systems • Specialties
For more facts circle 611 on Reply Card

NEW PRODUCTS

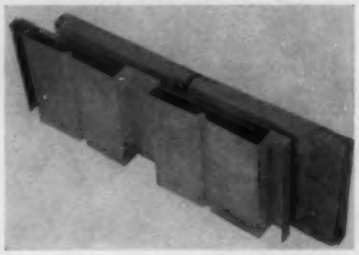
(Begins on page 136)

shell by this action, flow downward and are discharged into the collecting hopper. In the initial installation of this collector —for fly ash removal from a pulverized coal-fired boiler — efficiency of 97 per cent is reported. In addition to this type of use, the collector is suggested for recovery of any process dust. Hagan Corp.

43—WALL PANEL designed for field installation

The Type FA is a field assembled panel. Its components can be shipped to the job site where erection and fabrication take place at the same time. At the job site, the panel is assembled by welding or bolting a flat plate with Z bar attached to the structural supports. The horizontal channel is then secured to the Z bars by saddle clips and drive rivets.

Batts of 4-lb intensity fiber glass, 1½-in. thick, are forced in between Z



bars and channels. The fit is declared snug enough so that even high winds during erection will not dislodge the insulation. An asphalt impregnated felt strip is then pasted to the outside of the horizontal sub girt to prevent through metal, thermal conductivity. The exterior fluted sheet is positioned and holes drilled through it and the channel sub girt. Drive rivets are placed and struck, the side joints are vit-clinched and the installation is complete.

Only tools needed are a molly bolt spreader or a welding rig (depending on attachment method used), a power drill, hammer and riv-clinch tool. The assembly produces a panel 24 in. wide and nominally 3¼ in. deep, in lengths to 31 ft. The panel is available in 16-gage aluminum and 18-gage galvanized steel. It is said to have approximately the same insulating value as a 16-in. masonry wall. Detroit Steel Products Co.

44—WIRE SLINGS with protective coverings

Gripper Woven Wire Slings are now available with plastic or Neoprene covering for handling highly finished stock. Covering makes the Gripper Sling applicable for practically any handling operation, company says, even for material which has been milled or machined to a highly finished condition. It will last almost indefinitely under normal use, it

Foot-operated portable elevator in 750-lb. capacity.

"10 and 20 Line" portable hand elevators —wide range of models. Special attachments available.

Portable elevator pulling heavy dies from press bed to elevator.

HANDLING PROBLEMS?
Barrett elevators can help solve them

Maybe it's heavy machine dies...or storing...or stacking. Often the question arises "Where can I get handling equipment to do this job?" Chances are you'll find the exact model you need in the wide range of Barrett elevators designed for many shop, storage, warehouse or outdoor lifting operations.

★ TIME-SAVING hand-operated elevators guaranteed to give full-day service under full-load rating.

★ HEAVY-DUTY foot-operated models for low cost, all-purpose use. Will handle many jobs all around the plant.

Other Barrett elevator types: telescopic, four-post, crane, floor-to-floor, revolving base, electrically operated—each specifically designed for efficient handling operation. Through the line, quality materials combine with durable construction for low maintenance cost—a Barrett plus value since 1916.

Consult with your nearest Barrett representative (listed in local telephone directory) or write us, direct.

Material handling information at your finger tips

We will promptly mail you these two informative, illustrated bulletins on Barrett elevators.
USE THE COUPON

Barrett-Cravens Company
618 Dundee Road, Northbrook, Ill.

Gentlemen: Please send me Bulletins 558 and 5211 on Barrett elevators.

Name ..... *Title* .....

Company .....

Address .....

City ..... *Zone* ..... *State* .....

BARRETT-CRAVENS COMPANY
618 Dundee Road, Northbrook, Ill.
Representatives in All Principal Cities.
Canadian Licensee: S. A. Armstrong, Ltd., Toronto, Canada

Barrett Handling Equipment
BARRETT
ONE MAN DOES MORE THAN 3 OR 4...WITH A BARRETT

For more facts circle 612 on Reply Card

Thirty Million B.T.U. CAPACITY

with Precise Control of Temperature in Cooling

The NIAGARA Aero HEAT EXCHANGER cools liquids and gases by evaporative cooling with atmospheric air, removing the heat at the rate of input, controlling temperature precisely. You save 95% of cost of cooling water; you make great savings in pumping, piping, power; quickly recover your installation cost.

You can cool and hold accurately the temperature of all fluids, air and gases, water, oils, solutions, chemical intermediates, coolants for mechanical, electrical and thermal processes. You obtain closed system cooling free from dirt. You solve all the problems of water availability, quality or temperature.

In CHEMICAL PROCESSES this is successfully used in cooling liquids and gases, chemical reactions, condensing distillations and reflux cooling.

Write for complete information; ask for Bulletins 120 and 124. Address Dept. PE.

NIAGARA BLOWER COMPANY

405 Lexington Ave. New York 17, N.Y.

District Engineers in Principal Cities of United States and Canada

For more facts circle 613 on Reply Card

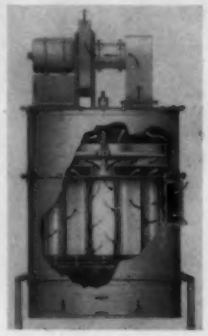
NEW PRODUCTS

(Begins on page 136)

is pointed out, and can be applied to slings of any length or width. It has negligible effect on the flexibility of sling, and slings so covered can be used in either basket or choke hitch. The Cambridge Wire Cloth Co.

45—DUST FILTER UNIT, air volumes to 1200 cfm

Latest addition to this company's line of Reverse Jet Dust Filters is the Type RJ, described as automatic continuous, low-cost unit to handle air volumes up to 1200 cfm. The Type RJ lends itself to all continuous process equipment, it is pointed out, because no shutdown is needed for cleaning—cleaning and dis-



charge of material is handled automatically and continuously. Major reason given for the high efficiency (reported 99.99 per cent) of this filter is its use of the Hersey principle of high velocity reverse air cleaning. It differs from the usual Hersey principle, however, in that dust is deposited on the outside of the filter sleeves. There are 12 filter sleeves in the unit and the filter media is a felted material. Reverse air for cleaning the sleeves surges from an indexing drum through each sleeve individually.

All moving parts are located on the clean air side of the filter media. The unit is shipped assembled ready for piping and electrical connections. It can be mounted on casters for shifting to places where temporary dust problems exist. The Type RJ can be furnished for pressure or vacuum operation. Further details are in Bulletin 560. The Day Co.

46—ROOF COATING requires no preparation

Known as Gaco Roof, this liquid Neoprene roof coating seals, weatherproofs and beautifies most types of roofs, it is announced, and no preparation is needed other than sweeping roof and driving exposed nail heads below the surface. As described by company, coating is applied easily with standard long-handle roofer's brush and air-cures in one hour into a tough, elastic coating that will not crack, chip or peel, and is fire resistant. Liquid

It's Good Accounting Practice!

TO MEASURE GAS CONSUMED BY INDIVIDUAL FURNACES, KILNS, OVENS, ETC.

Good management goes hand in hand with good measurement. Good managers know that by metering individual gas furnaces, kilns, ovens, etc., they will have accurate figures upon which to base product costs. They know that metered records of gas consumption will quickly show-up combustion deficiencies that affect the quality of the end product. They know, too, that with a meter standing guard over every department and at the inlet to every set of burners, wasteful fuel practices are discouraged.

Why don't you investigate the advantages of in-plant metering? Write the nearest Rockwell district office or use the handy coupon.

ROCKWELL "800" GAS METER

A lightweight aluminum alloy case meter having a capacity of 1600 c.f.h. at the accepted 2 in. differential when measuring 0.60 specific gravity gas. One of the complete line of Rockwell gas meters ranging in capacity from 150 c.f.h. to 10,000 c.f.h.

USE THE HANDY COUPON

Other Useful Rockwell Meters

ROCKWELL FLOW INDICATING METER

Measures rates of flow. Read directly from graduated scale in c.f.h. Time and money-saving production tools for manufacturers of gas appliances to use when setting, adjusting and testing flow rates.

ROCKWELL TEST METER

Fits the need for a gas meter with a large dial to be used in test or laboratory work. Ideal for visually demonstrating the consumption of gas appliances.

YOU CAN RELY ON ROCKWELL

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Chicago Dallas Houston Kansas City, Mo. Los Angeles New York Philadelphia Pittsburgh San Francisco Seattle Tulsa

In Canada: Peacock Brothers Limited

ROCKWELL MANUFACTURING COMPANY Dept. 102B
PITTSBURGH 8, PA.

Gentlemen:

I am interested in your meters for measuring gas to individual furnaces ☐. Your flow indicating meters ☐. Your test meters ☐. Please send literature ☐. Have representative call ☐.

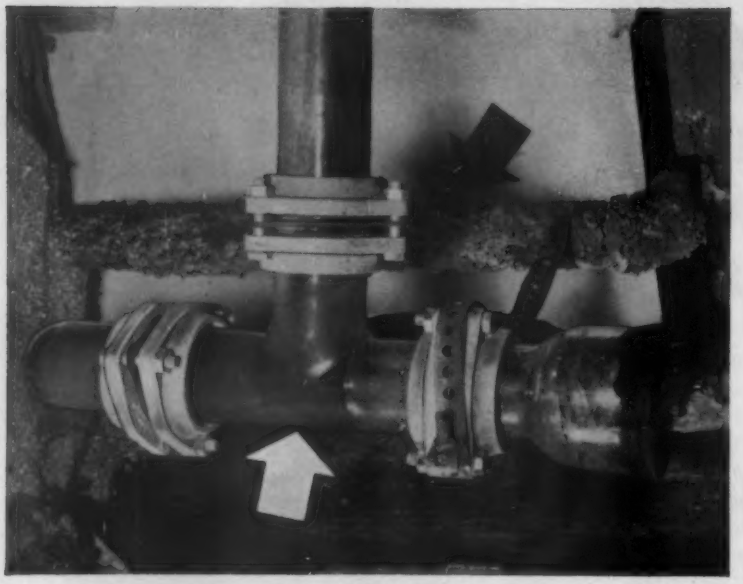
Your Name .....

Company .....

Street .....

City ..... Zone..... State.....

For more facts circle 614 on Reply Card



What happened to the metal drainline (black arrow) will never happen to the PYREX drainline (white arrow).

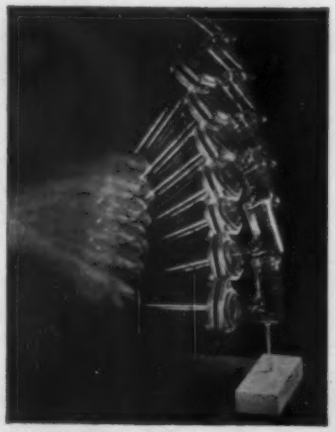
Stop the constant repair and replacement of your acid drainlines—**for good**

Many plant engineers are finding PYREX brand "Double-Tough" glass pipe a permanent answer to their acid drainline problems. Only hydrofluoric acid and phosphoric with traces of fluorides have any measurable effect on glass pipe.

But what about breakage? After all, it *is* glass. Tempered PYREX brand glass No. 7740 is called "Double-Tough" for good reason. It's made especially for industry. The chemical industry in particular is using miles and miles of it and much of it has been in service for many years without repair or replacement. PYREX pipe today is *not* fragile.

Besides its great resistance to corrosion, PYREX pipe is transparent. At any time you can see what's what inside your lines. Its hard, smooth inside surface resists clogging and makes cleaning easy. Your maintenance men or pipe fitters can install PYREX pipe as easily as ordinary pipe.

We make a wide range of pipe sizes and fittings. Write today for PYREX Pipe Bulletin EA-1. This will give you a more detailed picture of what PYREX pipe is and how it can eliminate your problem of handling acids and other corrosive materials.



Hammering home a nail with a piece of PYREX brand "Double-Tough" glass pipe demonstrates its strength.

CORNING GLASS WORKS
10-2 CRYSTAL STREET
CORNING, N. Y.
Corning means research in Glass

For more facts circle 615 on Reply Card

NEW PRODUCTS

(Begins on page 136)

Neoprene bonds shingles, it is noted, eliminates breakage, curling and loosening in high winds, and is not affected by rain, sun, ice, salt spray or corrosive fumes. It is claimed to give long lasting rust and corrosion protection on metal roofs, and can be applied to asphalt, asbestos, slate or metal roofs. Colors offered are gray, slate, black, red and aluminum. Gates Engineering Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

47—MERCURY LAMPS for indoor and outdoor service

Weather Duty Lamps, mercury and fluorescent-mercury, use an outer bulb of hard, tough glass for maximum resistance to damage from weather and mechanical hazards. In outdoor applications, outer bulb permits lamp to be installed in open fixtures. Indoors, lamps are suited for use wherever moisture, corrosive vapors, or mechanical hazards require a heavy-duty lamp. The Weather Duty line supplements company's standard line of mercury and fluorescent-mercury lamps in 400- and 1000-w ratings. Weather Duty Lamps are physically and electrically interchangeable with their standard counterparts. Westinghouse Electric Corp.

48—CENTRIFUGAL PUMP for no-leakage service

Two lines of leakless general purpose centrifugal pumps — the Electri-Cand — are announced for handling precious or hazardous liquids where no leakage is permitted. The pumps come in a fractional horsepower line (C-10) to include motors through 2 hp, and an integral horsepower line (C-11A and C-11B) covering motors above 2 hp. They accommodate heads to 250 ft and temperatures to 250 F and can be had with capacities to 500 gpm. The Electri-Cand utilizes the canned motor principle in which the rotor of the driving induction motor rotates in the fluid being pumped and is connected directly to the pump impeller. This construction requires no packing or mechanical seals, it is noted, and all rotating elements of pump and motor are contained in a thin wall cylinder or "can."

The Type C-11A integral horsepower models have fluid piston bearings throughout, which are supplied with liquid through an internal connection with the pump casing discharge nozzle. The liquid is forced through the bearing piping to the bearings, pressurizing bearing pads. The pressure, which is self-

Only Childers Jacketing Offers LAP-SEAL

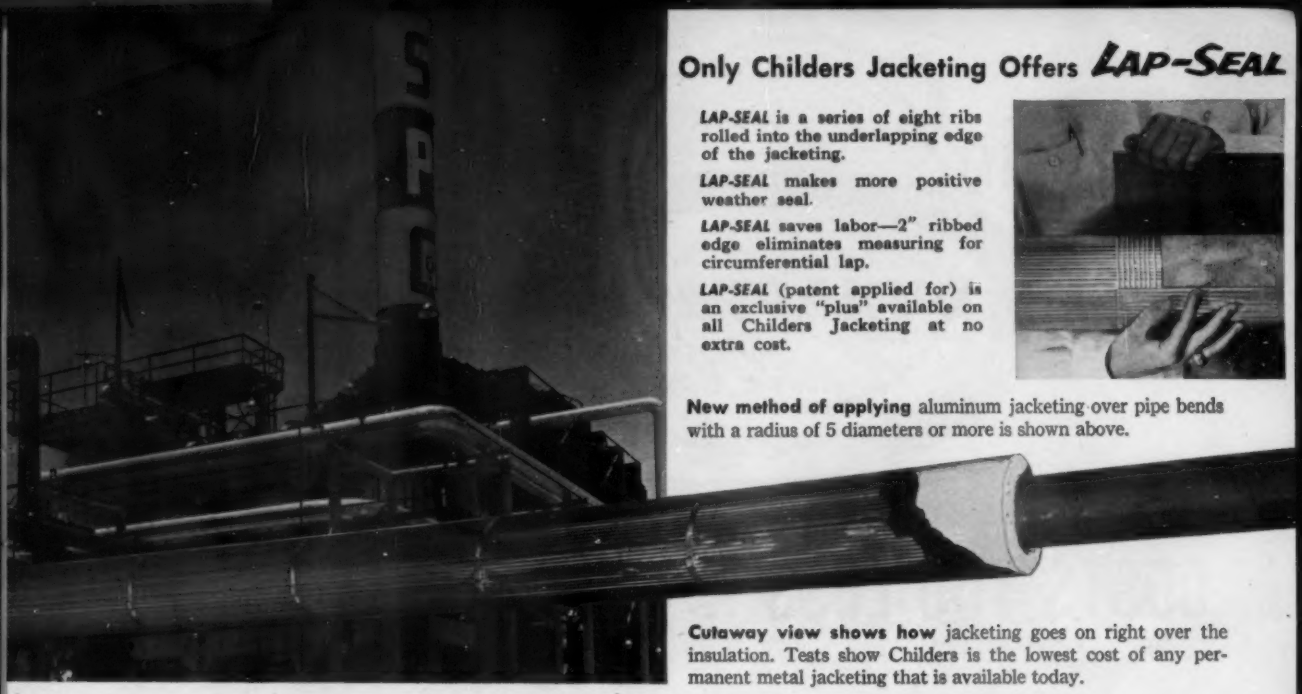
LAP-SEAL is a series of eight ribs rolled into the underlapping edge of the jacketing.

LAP-SEAL makes more positive weather seal.

LAP-SEAL saves labor—2" ribbed edge eliminates measuring for circumferential lap.

LAP-SEAL (patent applied for) is an exclusive "plus" available on all Childers Jacketing at no extra cost.

New method of applying aluminum jacketing over pipe bends with a radius of 5 diameters or more is shown above.



Cutaway view shows how jacketing goes on right over the insulation. Tests show Childers is the lowest cost of any permanent metal jacketing that is available today.

Only pliers and pocket knife needed to apply easy-to-handle Childers Aluminum Jacketing

Best method of applying jacketing is with aluminum strapping and seals. Other method is to use sheet metal screws.

Aluminum strapping can be pulled tight enough with just pliers. Lugs are then bent over and fastening is complete.

Eastern States Petroleum's two-man crew covers insulated lines, even L's and bends—using light-weight, weatherproof aluminum jacket.

Childers Jacketing for insulated lines, made of .006" 3S alloy aluminum, was used to cover thousands of feet of line in Eastern States Petroleum's Houston plant.

As it does in over 1000 other plants in all 48 states and many foreign countries, Childers Jacketing helped save Eastern States many expensive hours of application and maintenance time.

In fact, tests show this: Two men, working with Childers Jacketing for the first time, can cover more feet of insulated line in a day than with practically any other kind of covering. This means real savings in application costs.

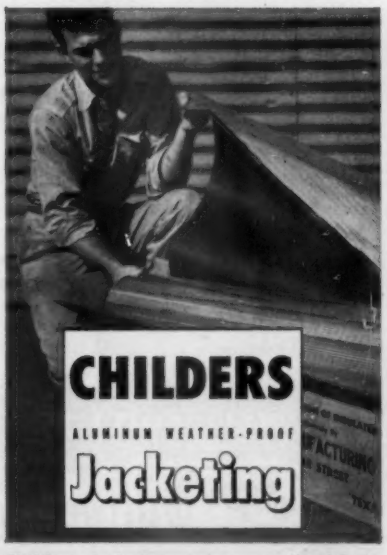
The cost is low, too. You can actually put aluminum jacketing on your lines for less than the cost of the cheapest weatherproofing when one paint job is considered.

Immediate shipment from our large factory stocks can eliminate costly delays in construction or plant improvement schedules.

Try this low cost protection in your plant. Write today for engineering data and information about how you can order a 400 sq. ft. roll to test on one of your insulated lines. No obligation. Address: Childers Manufacturing Company, Department PLE-7, 3620 West 11th Street, Houston, Texas.

Engineering representatives in most cities to work with you on jacketing problems.

For more facts circle 616 on Reply Card



Childers Jacketing arrives on the job in convenient rolls 4 feet wide and 100 feet long—easy for one man to handle. Jacketing comes with or without a moisture barrier attached to the back of the .006" aluminum. Rolls are well protected for field storage if kept dry. Boxes light enough for one man to carry. (Adv.)

HERE'S WHY

COSTS YOU LESS...

DYNAPRENE Flexible Cord is built to last under the most rugged shop conditions. Lower priced cord can be bought, but **DYNAPRENE** lasts so much longer that there are fewer replacements, a minimum of down time for tools and less labor lost . . . all of which adds up to economy.

HERE'S HOW DYNAPRENE IS BUILT

DYNAPRENE has flexible stranded copper conductors; separator over conductor to protect the insulation from corrosive effects of copper; high dielectric-strength rubber insulation; fillers for strength and roundness; textile covering for firmness and reinforcement; extra tough, long lasting, tire-tread type neoprene jacket with oil and sunlight resistance to withstand the most rugged working conditions. **DYNAPRENE** Flexible Cord is available in Underwriters' type SO, SJO and SV-neoprene jacketed.

For long life and true economy be sure you get **DYNAPRENE** Flexible Cord.

WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

For more facts circle 617 on Reply Card

NEW PRODUCTS

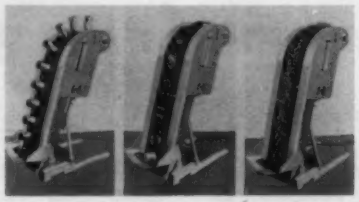
(Begins on page 136)

adjusting, keeps the shaft centered in the bearing. Leakage from bearing is collected and returned to pump suction.

Construction of the C-11B model is similar, except that external piping is eliminated and less costly carbon sleeve radial bearings are used. There is some circulation of the liquid to wet the bearings and to flush out any solids. Elimination of the bearing piping makes it possible to replace stators without opening the system. The fractional horsepower pumps have only carbon sleeve radial and thrust bearings. Pumps for any applications within the range of the two lines can be tailor made from standard parts. Allis-Chalmers Mfg. Co.

49—MAGNETIC UNIT for ferrous parts handling

For automated handling of cans, nails, blanks, bottle caps, finished parts and scrap, this permanent magnetic elevator-conveyor is designed to operate efficiently even under space limitations. Called the Magna-Mover it is declared notable for several features. Its extended transition section for discharge into carts, bins, or



other machinery, has a bed curved on a radius of 15 in. to allow handling of relatively large objects with high centers-of-gravity. The fork-like legs of the base, only 1½-in. high, fit under low pallets, skids, machines. The inclined magnetic bed is adjustable from 60 to 90 deg relative to the floor line.

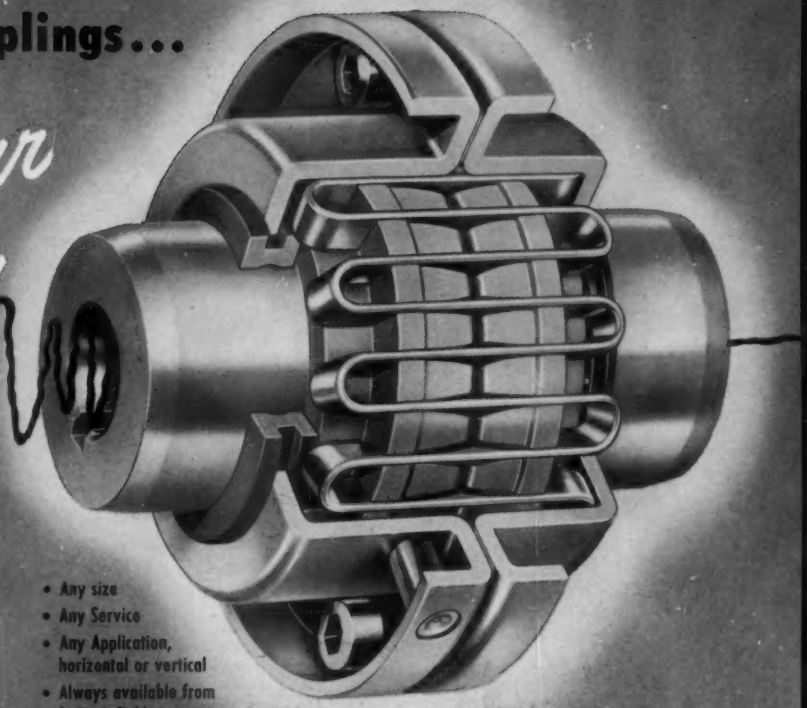
Automation values of the Magna-Mover are many, company states. The unit has two 4-in. diam wheels, and for extreme mobility, caster attachments are available for the fork ends. Motor and drive are enclosed in a steel housing. Supplied in stock bed lengths of 4, 5 and 6 ft (other lengths available), Magna-Mover has a three-ply 8-in. wide belt, with or without cleats; company's Hi-Power Alnico V magnetic element; a ½ hp single phase industrial motor which drives the belt at 85 fpm. Bulletin 504 gives complete information on this unit. Eriez Mfg. Co.

50—MASTIC COATING is fire-resistive product

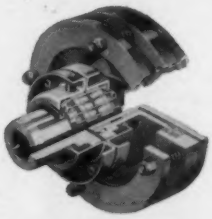
Fire-Resistive Mastic 60-60N is announced as a balanced combination of non-asphaltic fibrated polymers in non-flammable solvents, and as accepted by Underwriters' Laboratories for listing as fire resistive. It was developed to meet

Falk Steelflex Couplings...

Protect your machinery in 2 ways



- Any size
- Any Service
- Any Application, horizontal or vertical
- Always available from factory, field or distributor stocks

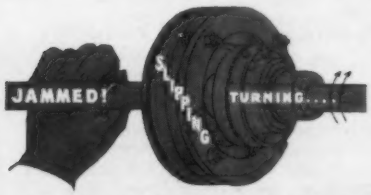


Falk Controlled Torque Couplings prevent damage from overloads

In applications where danger from overloads exists, use the FALK Type FT Controlled Torque Coupling. The Type FT has all the features and advantages of standard FALK Steelflex couplings—and, in addition, has an adjustable friction slip clutch, enabling the operator to set the coupling to slip at any predetermined overload.

This controlled-torque principle not only prevents transmission of dangerous shocks and limits overloads; it eliminates the breaking of shafts caused by jamming of driven equipment.

An outstanding advantage of the Type FT Coupling is that, as soon as the cause of the overload is removed, the entire coupling will rotate and transmit power without replacing parts or repairing coupling.



There's real economy in using Type FT Controlled Torque Couplings. Many users have reported that these couplings paid for themselves the very first time they slipped (under overload) because of the protection against damaged driving or driven machinery!

...cost less per year of service!

You get *double protection* when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel coupling with the exclusive grid-groove design! First, its *torsional resilience* smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery... are trouble-free and need minimum maintenance... are easy to install, lubricate and disconnect... and *cost less per year of service* than ordinary couplings.

One basic Steelflex design—the type F, in its many sizes—is adaptable to more than 90% of all industrial applications. For applications involving danger from overloads, Modified Type FT Controlled Torque couplings (see column at left) are ideally suited. There are numerous other special or dual purpose Steelflex couplings for unusual applications. **Write to Department 247** for engineering bulletin, including selection and dimension tables.

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

FALK

...a good name in industry

MANUFACTURERS OF:

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

For more facts circle 618 on Reply Card

ACCESSIBILITY

is built into the
Continental
BOILER

. . . saves production time
. . . saves maintenance dollars

Rugged, simple in design, accessible—that's the Continental Automatic Boiler. Here are a few reasons why it's easy to keep this packaged steam generator at peak efficiency:

- Openings are provided to facilitate inspection of steam and water space.
- Both front and rear doors are hinged—affording quick access to furnace and return tubes.
- Cleaning, when necessary, is easy. One man can open both doors in a matter of minutes.

AND HERE'S WHY CONTINENTAL BOILERS STAY EFFICIENT FOR A LONG TIME:

- 2-pass design eliminates refractory baffles in front and rear which may burn out, leak and cause short circuit of gases.
- *All* return tubes are subjected to the same temperature and do equal work . . . and there is more uniform longitudinal expansion of the pressure vessel.

Used for high or low pressure steam and for hot water applications, Continental Boilers are fully automatic, range from 20 to 500 hp. and can be gas, oil or combination fired. Over 80% efficiency is guaranteed.

Send for Bulletins BE3-4 . . . and let us bid on the next boiler you need.

Continental
AUTOMATIC BOILERS

BOILER ENGINEERING
and Supply Company, Inc.

2 Manavan Street
Phoenixville, Pa. Phone 5832

For more facts circle 619 on Reply Card

NEW PRODUCTS

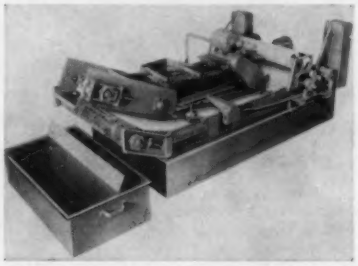
(Begins on page 136)

the need for mastic coating which could not be ignited accidentally by innocent sources of flame and sparks during construction processes.

Test results are reported to show that this material is non-flammable in the wet state; when dry and exposed for 2 min to violent kerosene flame, it stops smoldering within 7 sec after removal from flame. The dry mastic film is also claimed to retain maximum flexibility and high resistance to chemicals indefinitely and to offer superior resistance to prolonged high heat. As a coating for insulation on refrigerated lines and vessels, Fire-Resistive Mastic 60-60N is described as an excellent vapor barrier with a vapor-permeance of only 0.02 perm. It comes in natural resin color or in aluminum—either can be painted over without a sealer coat—according to manufacturer. Benjamin Foster Co.

51—MAGNETIC UNIT is compact separator-filter

For separation of ferrous sludge and abrasives from coolants, this Delpark unit is claimed to have greatly increased magnetic attraction. It uses a new method of gravity flow and magnetic



attraction — utilizing gravity flow of liquids on top of the magnets to give the benefit of both gravity and magnetic separation. Due to the efficiency of the magnets in handling the great swarf load, the filter size has been reduced while flow capacity has been increased. From 25 to 50 per cent less floor space is required, than formerly, says manufacturer, and operating costs are reduced, too. The units are self cleaning and automatic. A tote box with a dividing plate separates swarf from the used paper. Industrial Filtration Co.

52—WATER HEATER requires no storage tank

The WH series of tankless twin coil volume water heaters can now automatically supply large quantities of instantaneous, sanitary hot water through copper coils, without a storage tank, it is announced, for every size and type of building. Supplied with an oil or gas burner and built to ASME Boiler Code specifications, heaters are available in 14 sizes, delivering hot water from 300 to

For more facts circle 628 on Reply Card →

Come to Crouse-Hinds

for Complete Protection against

Electrically-Ignited Explosions...

CONDULET® Explosion-Proof Electrical Equipment

for areas defined by the National Electrical Code as hazardous.

Rigid Conduit Fittings
Junction Boxes
Lighting Fixtures (Fluorescent & Incandescent)
Pendent Fixture Hangers
Motor Starters and Circuit Breakers
Switches
Plugs and Receptacles
Process Control Boards and Systems
Communication Systems
Instrument Enclosures
Panelboards
Mercury Switches
Signals, Alarms
Push Button Stations
Pilot Lights
Ventilating Breathers and Drains
Seals
Flexible Couplings
Unions

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

No chain of explosion-proof electrical devices is stronger than its weakest link.

Crouse-Hinds — and only Crouse-Hinds — can provide positive protection *wherever* the merest spark can possibly occur in explosive atmospheres . . . from size 5 motor starters to sound-powered telephones. There are over 15,000 conventional and explosion-proof products in the Condulet line! They are available through your Crouse-Hinds distributor.

For further assistance on your explosion-proofing problem, just call the nearest Crouse-Hinds office listed below. Our field engineers are *electrical* engineers, fully qualified to make specific recommendations for your plant.

CROUSE-HINDS COMPANY

SYRACUSE 1, N. Y.

OFFICES: Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., St. Louis, St. Paul, San Francisco, Seattle, Tulsa, Washington. RESIDENT REPRESENTATIVES: Albany, Atlanta, Baltimore, Baton Rouge, Charleston, Chattanooga, Corpus Christi, Reading, Pa., Richmond, Va., Shreveport. Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

CONDULETS • FLOODLIGHTS • TRAFFIC SIGNALS • AIRPORT LIGHTING

NEW PRODUCTS

(Begins on page 136)

6000 gal per hr at 100-deg rise.

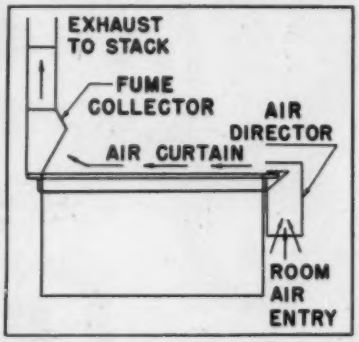
Submerged twin coils are connected adjacent to each other, submerged horizontally across top section of heater, where the hottest water is contained. One coil performs as a preheater, permitting complete hot water circulation through coils. Twin coils being completely surrounded by fast circulation hot water, it accomplishes quick temperature pickup and requires no recovery time, causing heater to meet high hot water requirements without a storage tank. When two temperatures of evenly tempered instantaneous hot water are required, 140 deg for general use and 180 deg sterilizer-rinse, both can be supplied from the same heater, it is claimed. Portmar Boiler Co. Inc.

53—REGULATING VALVE has wide adjustment range

The No. 56 is a pressure actuated condensing water regulating valve designed with a wide continuous adjustment range —60 to 260 psi. This wide range permits use of this one valve on either Freon 12 or Freon 22 systems, company points out, as well as all other common refrigerants except ammonia. All adjustments can be made by hand. A knurled cap at the bottom of the valve permits easy on-the-job adjustment without wrench or screwdriver. Valve is described as small and compact, direct acting, of diaphragm construction and well balanced. It may be mounted in any position without the use of mounting brackets and may be manually serviced without breaking connections. Marsh Instrument Co.

54—FUME REMOVER is push-pull type system

Air Saver Fume Removal Systems are reported to offer design and cost advantages in ventilating, plating, anodizing and pickling tanks. These push-pull type systems consist of a collector or exhaust hood for removing the fumes, and a director for supplying a current of air at

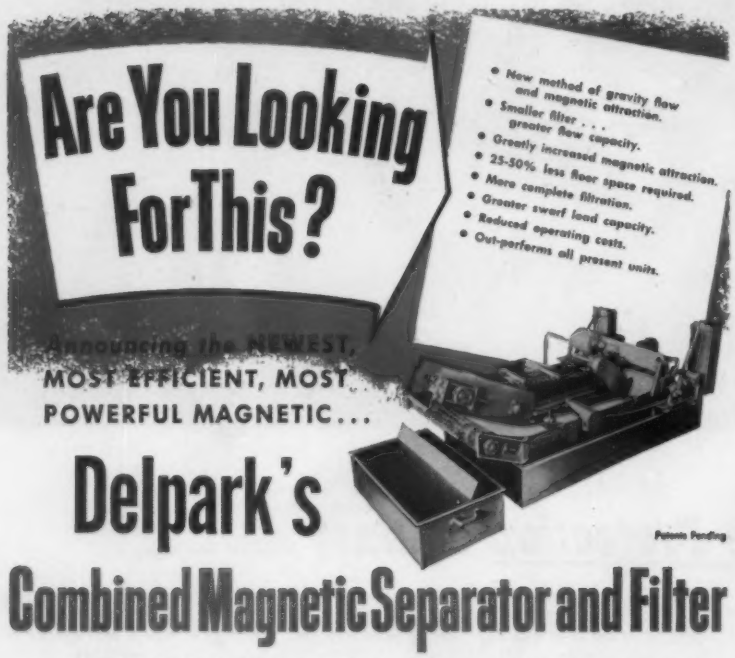


proper velocity to lead the fumes into the hood. The director, a compact air supply unit, containing its own motor and blower, is designed to furnish an even air current across a tank surface, for ventilating tanks up to 6-ft wide.

This system will save heat, it is pointed out, because fume removal rates are reduced up to 75 per cent, thereby minimizing room heat losses. Savings in power are attributed to the smaller fans required, and reduced initial costs are also claimed, because smaller ducts and stacks can handle the reduced volume of fumes to be removed. The systems are available in solid Rigidon plastic, steel, or steel lined or coated construction, with up-draft or down-draft hood. Heil Process Equipment Corp.

55—DRAFTING BOARD and companion instrument

Drafteze is a combination of a new drawing board engineered to make possible the use of a new instrument—an angular T square and a protractor. With it angular drawings are simplified. You determine the proper angle and set the indicator on the protractor at the proper degree; the construction of the T square and protractor assures perfect parallel lines, says manufacturer. If a 90-deg angle is desired, you set the T square indicator at right angles and let it lock into position. Need for a drafting arm is reported unnecessary much of the time. The board


Are You Looking For This?
• New method of gravity flow and magnetic attraction.
• Smaller filter . . . greater flow capacity.
• Greatly increased magnetic attraction.
• 25-50% less floor space required.
• More complete filtration.
• Greater swarf load capacity.
• Reduced operating costs.
• Out-performs all present units.
Announcing the NEWEST, MOST EFFICIENT, MOST POWERFUL MAGNETIC...
Delpark's
Patents Pending
Combined Magnetic Separator and Filter
CONTINUOUS, FULL FLOW, SELF-CLEANING, FULLY AUTOMATIC FOR THE REMOVAL OF FERROUS SLUDGE AND ABRASIVES FROM COOLANTS
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FIRST in Filtration Advancements
BACKED BY MORE THAN 40 YEARS EXPERIENCE IN INDUSTRIAL FILTRATION
UNEQUALLED IN EFFICIENCY . . . gives filtration performance never before possible on production work. The only separator using gravity flow of liquids on top of the greatest magnetic power giving benefit of both gravity and magnetic separation. Reduced filter size . . . 25 to 50% LESS FLOOR SPACE REQUIRED.
Write for more detailed information.
INDUSTRIAL FILTRATION COMPANY
LEBANON, INDIANA

For more facts circle 621 on Reply Card

NEW PRODUCTS

(Begins on page 136)

itself is white birch with a replaceable, moisture resistant covering of laminated paper. Guide rails, on three sides of the board, are aluminum, and the hand-made T square is mahogany. Complete unit with 24-by-32-in. board costs around $35. Weller Engineering Co.

56—PLATFORM SCALE with steel platform for trucks

This low-cost platform scale is designed to weigh hand trucks and skids of scrap metal, paper and incoming and outgoing freight shipments. It costs 40 to 50 per cent less than scales of comparable size and capacity, manufacturer says. The company, who makes scales for weighing livestock on farms and ranches, has revamped their product for industrial use by adding a steel platform and mounting frame. The result is a rugged 3000 lb capacity scale with a 29-by-94 in. platform. Ferguson Products Co.

57—WIRE ROPE STRAIGHTENER renovates used cable

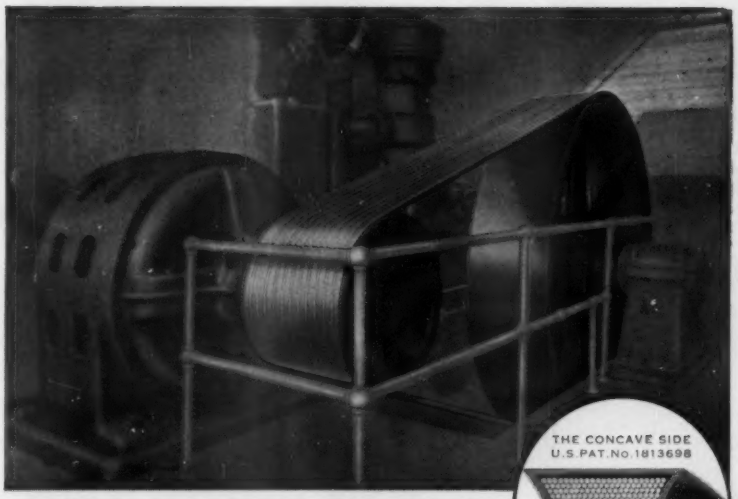
Portable and easily operated by one man, this wire rope straightener is designed to remove bends, twists, loops, and kinks from all sizes of cable. Length of cable and eyes present no problem, it is said, and it is not necessary to re-string equipment. By renovating used cable, expense of splicing new eyes in new slings is eliminated. This makes the work of riggers and others handling wire rope easier, company points out. In addition, the use of the wire rope straightener in the field can result in savings by eliminating replacement of twisted or damaged cable. Cable Strate Co.

58—PLASTIC TEMPLATE with hydraulic symbols

The No. 46, a hydraulic symbols template, has cutouts that depict J.I.C. standards of industrial hydraulic symbols for designing hydraulic circuits. Made of matte finish plastic, the template is 7 by 4½ in. It will sell for around $3.00. Rapidesign, Inc.

59—STAINLESS STEEL FAUCET for hazardous liquids

With a protective, corrosion resistant anti-flash screen in the nozzle, this stainless steel faucet is designed for use with volatile and inflammable solvents or other hazardous fluids. It is manufactured in 304 stainless steel throughout, with chemically inert Kel-F seal rings. The fume-tight, sanitary faucet permits full flow, says company, and has automatic, positive shut-off action which prevents after-drip. It can be disassembled quickly, and the shank is supplied in interchangeable sizes of ⅜, ¾ and ½ in. with tapered threads to allow a tight fit



Why a V-Belt with

CONCAVE SIDES

wears longer

It is easy to demonstrate to yourself why the concave sides (Fig. 1) of the Gates belt greatly lengthen belt life.

Simply bend a Gates belt and feel the sides. Notice how these precisely engineered concave sides *fill out* on the bend and *become straight.* Thus a Gates belt grips the sheave groove evenly (Fig. 1-A) and wear is distributed uniformly across each side of the belt. That means longer belt life; lower costs.

Make the same test with a straight-sided belt (Fig. 2) and see what happens. The sides bulge out on the bend (Fig. 2-A) concentrating the wear at points shown by arrows.

To assure longer wear and keep belt costs down, specify the V-belt with concave sides—Gates Vulco Rope . . . readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado —*World's Largest Maker of V-Belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

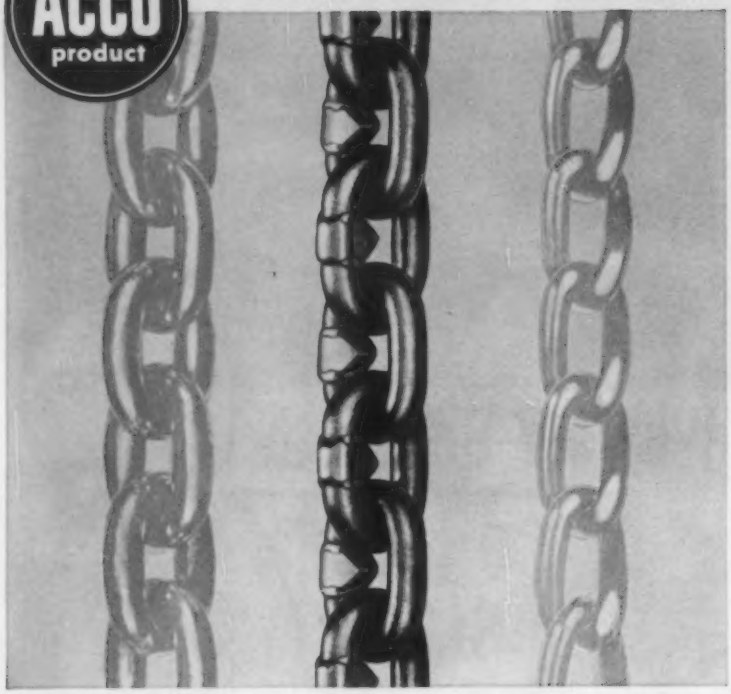
TPA 68

Gates VULCO ROPE Drives

For more facts circle 622 on Reply Card

an ACCO product

American Chain



ACCO's Great New Chain . . .

ACCOLOY X-WELD 125

. . . the Chain that Identifies Itself

You can spot it instantly! Even in the company of other fine AMERICAN-made chains, the great new **Accoloy X-Weld 125** chain identifies itself on sight by its unique link formation. Each link's big, outsize welded area is 2¼ times that of links welded by other processes.

Accoloy X-Weld 125 has welds as strong or stronger than the alloy material . . . welds whose projecting lugs prevent dangerous kinking of the chain. These chains hang straight as a die. And they have greater strength with less weight!

These great chains—in ¼", ⅜", ½", ⅝" and ¾" sizes—are ideal for slings, bundling, towing, general utility chains. Write American Chain Division, York, Pa., for descriptive bulletin.

ACCO

TRADE MARK

American Chain Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

Better Value

For more facts circle 623 on Reply Card

NEW PRODUCTS

(Begins on page 136)

in bung threads of dispensing drums. Increased safety is reported to be achieved by eliminating metal to metal contact in valve operation. All frictional contact is limited to Kel-F plastic seal rings moving against inside walls of body chamber. In addition, plunger cannot seize, manufacturer states. Faucet with anti-flash screen is also available in chrome-plated brass for non-corrosive service. Economy Faucet Co.

60—GRAVITY CONVEYORS, galvanized steel channel

Recently introduced is a line of galvanized steel channel Rapid-Wheel and Rapid-Roller gravity conveyors — at no increase over company's regular baked-enamel steel channel conveyors. The new galvanized models are available in the Rapid-Wheel line in widths from 12 to 24 in., and in all widths of the Rapid-Roller line of 1¾ and 2-in. diam rollers. Outstanding advantage announced for the new conveyors is that they keep their new appearance in spite of wet conditions. They are claimed well suited to outdoor operations and moist areas such as cold storage rooms, food processing plants and other industrial areas where cold causes water condensation. The Rapids-Standard Co., Inc.

61—SPACE HEATER, direct fired; burns oil, gas

High efficiency, low cost and quick installation are reported for this direct fired space heater which is equipped with single switch changeover for oil or gas firing. The heater may be used for heating in winter, ventilating in summer and comes in eight sizes from 400,000 to 2,000,000 Btu per hour output. It has a stainless steel combustion chamber, automatic combustion control system, and each function is controlled by a separate motor. Fans are large and slow for quiet operation. Airtherm Mfg. Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 201-202.

62—HOT OIL SYSTEMS are electrically heated

Electrically heated and fully automatic, Merrill Process Systems are designed to produce any oil temperature within the range of 150 to 600 F at low pressure in a compact, packaged unit. In most cases only minor alterations of existing plant process vessels are needed for high temperature oil heating. There is no necessity for stay-bolting jackets or installing heavy pipe coils, it is noted, as the maxi-

Two-stage air cleaning: high efficiency centrifugal collector (at left) plus cloth media filter.

pharmaceutical manufacturer finds

KIRK AND BLUM DUST CONTROL

"just what the doctor ordered!"

To maintain rigidly controlled and conditioned plant atmosphere, air returned from cleaning operation is heated or cooled as required.

To insure, in all manufacturing steps, the purity of The Wm. S. Merrell Company's products, Kirk & Blum Dust Control Systems were installed by this well known pharmaceutical manufacturer. Dust is eliminated at its source to meet the plant's strict requirements. Since the building is air conditioned, cleaned air is tempered (warmed or cooled) before it is returned to the plant.

Whatever your problem, put it up to experts in air handling . . . KIRK & BLUM—with over **48** years' experience in Dust and Fume control.

KIRK & BLUM

FOR ILLUSTRATED LITERATURE . . . WRITE TO

THE KIRK and BLUM MANUFACTURING CO.
3189 FORRER STREET, CINCINNATI 9, OHIO

DUST CONTROL

For more facts circle 624 on Reply Card

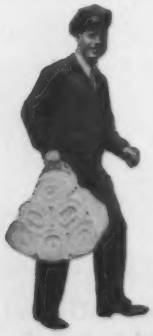
A showplace for Atlanta... a showplace for clean Cotton Towels*

*Fairfax Towels used by Fulton National Bank Building are supplied by Atlanta Linen Service, Division of National Linen Service Corporation

● **The new FULTON NATIONAL BANK BUILDING** was designed to furnish the people of Atlanta, Georgia with the most up-to-date, efficient and spacious banking facilities possible. In addition to the bank itself this completely air-conditioned 25 story building provides office space for many leading local and national concerns.

Naturally, management of this ultra-modern building is anxious to combine complete tenant satisfaction with top operating efficiency and sound economy. Carefully conducted tests showed that this meant cotton towels in *all* washrooms. The soft, at-home touch of cotton goes a long way toward maintaining the excellent tenant-management relationship which exists. And from a business viewpoint the lowered maintenance costs, reduced fire hazard and cleaner, tidier washrooms add up to real efficiency.

Take your cue from wise management—give the towel job to cotton in your office building, plant or institution. Write for free booklet which explains how cotton towel service will help you. The address: Fairfax, Dept. P, 65 Worth St., New York 13, N. Y.



Here's How Linen Supply Works...

You buy nothing! Your linen supply dealer furnishes everything at low service cost—cabinets, pickup and delivery, automatic supply of freshly laundered towels and uniforms. Quantities can be increased or decreased on short notice. Just look up LINEN SUPPLY or TOWEL SUPPLY in your classified telephone book.

Clean Cotton Towels...
Sure Sign of Good Management

Fairfax Towels

A PRODUCT OF WEST POINT MANUFACTURING CO.
WELLINGTON SEARS CO., SELLING AGENTS, 65 WORTH STREET, NEW YORK 13
For more facts circle 625 on Reply Card

NEW PRODUCTS

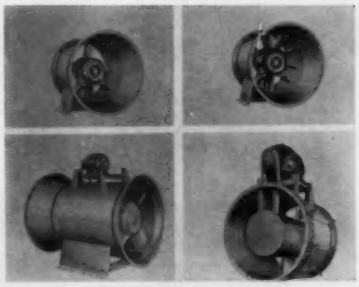
(Begins on page 136)

mum pressures developed rarely exceed 15 lb. Systems can be made explosion proof and are said to be well suited for the heating of individual tanks or kettles. They may also be used as central station systems so that a number of tanks or kettles may be heated at one time even though they require different temperatures. Valving and controls provide for any type of operation. Bulletin 1255 gives details. Parks-Cramer Co.

63—AXIAL FANS for ventilation and air supply

Series 203 Axial Fans are announced as featuring universal mounting, space economy, straight-line flow and low installation cost for use in industrial ventilation, process air supply and process air recirculation. They have cylindrical casings, allowing installation in ducts requiring a minimum of space. The fans can be mounted in several ways for vertical or horizontal airflow. Integral support legs can be provided for wall, ceiling or floor mounting. When ducts are properly reinforced, the fan can be supported directly by duct connections.

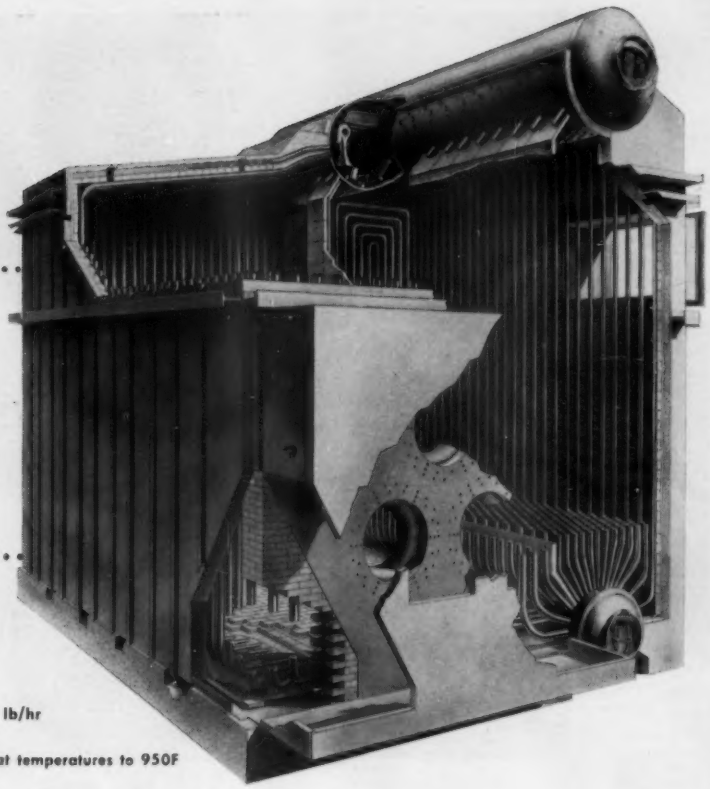
Series 203 Axial Fans are available as tubeaxial or vaneaxial designs. The



tubeaxial fan (upper left in photo) is designed for a wide range of volume at medium pressures and is a direct drive unit. Application is limited to handling of air or gases which will not damage the motor—or for general ventilation. Tubeaxial fans come in 12 sizes having free deliveries up to 68,000 cfm and for use with static pressures to 2¼ in.

The vaneaxial fan is designed for a wide range of volumes and pressures, and is available in direct-drive (shown upper right) or V-belt (lower left) drive units. The V-belt drive type has an externally mounted motor with the belts protected from the air stream, to permit handling of lightly contaminated air up to 150 F, as in fume exhaust and cooling tower applications. A vaneaxial modification is the spraybooth fan, (lower right). Direct-drive vaneaxial fans come in 12 sizes, produce free deliveries to 58,500 cfm, and are rated for static pressures to 2¼ in. The 12 sizes of V-belt drive vaneaxial fans provide up to 51,000 cfm, for static pressures as high as 3¼ in. American Blower Corp.

Series "SC" STANDARD Steam Generator



FUELS: Oil or Gas
CAPACITIES: 50,000 to 150,000 lb/hr
STEAM PRESSURES: to 1500 psi
STEAM TEMPERATURES: Superheat temperatures to 950F

PRE-ENGINEERED FOR SAVINGS

in first cost, installation, operation, maintenance

Series "SC" Steam Generator is of the pre-engineered, standardized design, with all exterior and structural details fixed. Available in nine sizes, with capacities of 50,000 to 150,000 lbs steam per hr, it incorporates many advanced design features – as noted in the accompanying list – that make possible important savings in industrial steam costs.

Burners, controls, upper drum mountings and other equipment requiring attention are located at the front of the unit. Heat recovery equipment and fans can be placed near the operating aisle for either single or multi-unit installations, providing unusual accessibility and ease of operation.

Write us today for further information on how the Series "SC" Standard Steam Generator can meet your individual plant needs for power or process work. *Foster Wheeler Corporation, 165 Broadway, New York 6, New York.*

FEATURES AT A GLANCE

- Completely water-cooled furnace
- Over 19-foot firing depth
- Unrestricted circulation
- All-welded casing
- Fully drainable superheater
- Efficient convection surface
- Bottom supported unit
- Steam purifying system
- Full insulation

FOSTER WHEELER

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For more facts circle 626 on Reply Card

with

R-W "Zig-Zag"®

CONTINUOUS POWER CONVEYORS

Photo above clearly shows extreme flexibility possible with Zig-Zag Conveyor. Note short radius return curve, variety of dips and rises, and minimum superstructure.

With America's ever-expanding economy comes the need for more production space. And, when space is at a premium, cramped working conditions and materials-handling bottlenecks always appear.

Today, more and more companies are finding a solution to these problems with Richards-Wilcox ZIG-ZAG Continuous Power Conveyors. ZIG-ZAG Conveyors operate *continuously... overhead...* keeping things moving on the production line and between departments, and releasing valuable floor space for other purposes.

ZIG-ZAG Conveyors operate with maximum economy, versatility and flexibility. They move up, down, in, out and around, "like water through a pipe". ZIG-ZAG is designed to handle in continuous production any load a man can lift. Carrying pendants are located on 6-inch centers and a choice of drive units permits travel at any required speed with variations of 10 to 1 or better. And when changing conditions require alteration, expansion or relocation of ZIG-ZAG Conveyors, the job can be easily performed by plant personnel, usually without waste of a single part.

Richards-Wilcox ZIG-ZAG Continuous Power Conveyors keep production on the *go*. For full information on how they can help you, write for descriptive catalog No. A-93.

Richards-Wilcox Mfg. Co.

MATERIALS HANDLING DIVISION

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SLIDING DOOR HANGERS & TRACK · FIRE DOORS & FIXTURES · GARAGE DOORS & EQUIPMENT · DOOR OPERATORS · INDUSTRIAL CONVEYORS & CRANES · SCHOOL WARDROBES & PARTITIONS

For more facts circle 627 on Reply Card

NEW BOOKS

for the plant engineer

Motion and Time

DIMENSIONAL MOTION Times—Development and Application. Size 10⅞ by 8½ in.; 100 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N.Y. Price $4.00.

FOR SOME TIME, people in industry have been using the stop-watch method for motion-time study. Now there is another method to supplement the first one and replace it in some types of operations. This system uses the dimension of production parts and determines operational times synthetically.

The method reported in this book is based on considerable study which includes laboratory work. Through the handling of parts that were closely dimensioned, differences in grasp times were noted as thicknesses of objects varied. Positioning times also were observed. In practice, this system is applicable to repetitive production operations in which work conditions are controlled. It is not recommended on maintenance jobs or where conditions vary appreciably such as may be the case in job shops.

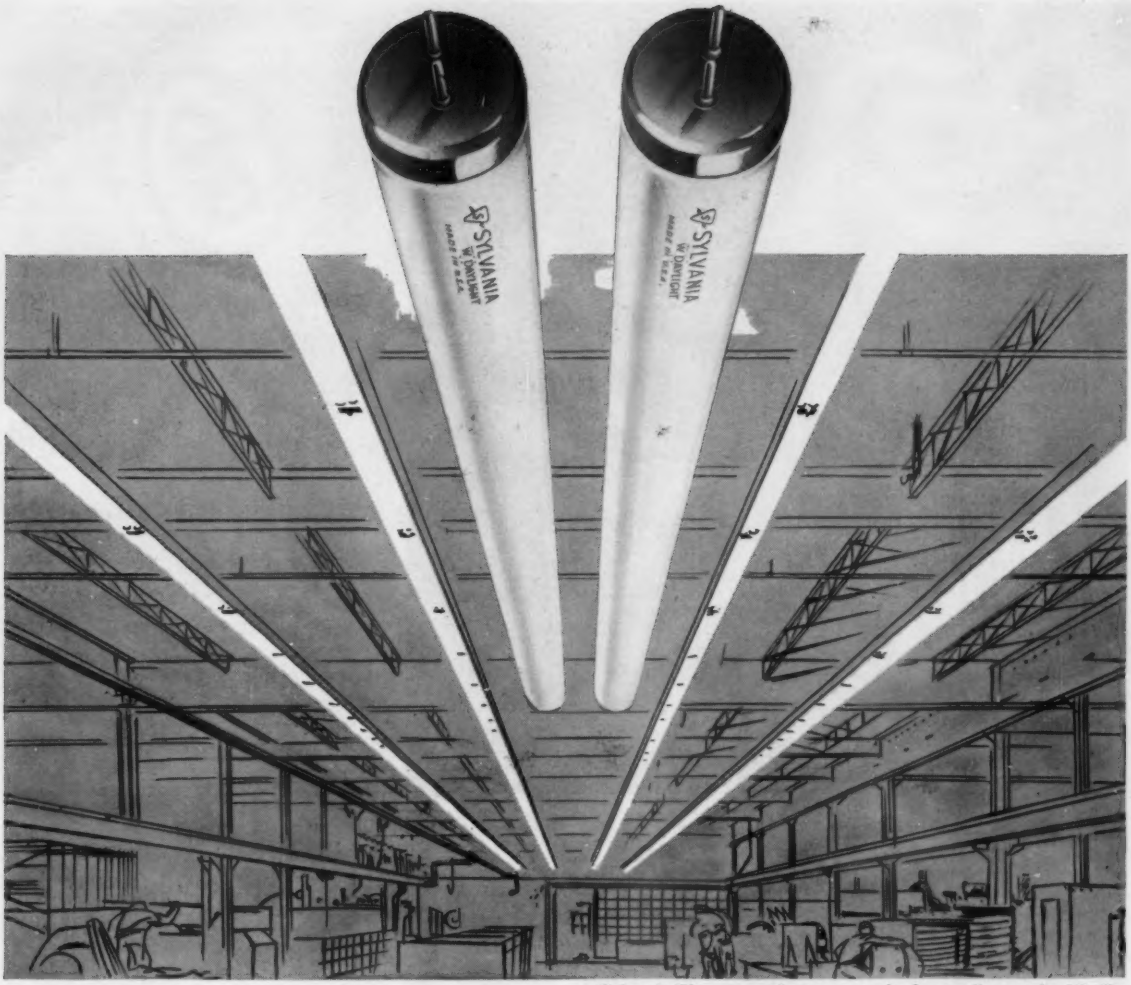
The publication contains tables of times and gives examples showing the use of chart figures. Some of the subjects considered are: need for Dimensional Approach; DMT training requirements; motion classifications, codes and descriptions; effect of contour irregularities on grasping time; and steps for analyzing production methods.

Lubrication

INDUSTRIAL LUBRICATION PRACTICE by Paul D. Hobson. Size 9¼ by 6½ in.; 555 pp including index; illustrated; cloth bound. Published by the Industrial Press, 93 Worth Street, New York 13, N.Y. Price $8.00.

KNOWLEDGE OF LUBRICANTS and their proper application is of especial interest to responsible people in industry. It can result in savings in equipment and down-time reduction. Some companies that have given due recognition to the importance of good lubrication, have specialists in their employ. While in other instances, the maintenance engineer, foreman, and others may be responsible for lubrication in addition to their other duties.

This book offers assistance to these people. It stresses the practical approach; in it, attention is given to specific categories of equipment such



Sylvania Fluorescent lamps carry the famous "money-back" offer to outperform the lamps you are now using, as stated below.

These are the lamps that raise plant efficiency and lower lighting costs

Modern management recognizes good lighting as a potent plant tool that consistently helps lower costs and increases production.

Among many of the country's largest industrial producers Sylvania Fluorescent lamps are first choice for economically efficient, long-lasting, high-output illumination . . . and quality of the finest degree possible is one of the prime reasons for their position of preference.

Equally important, when you buy Sylvania Fluorescent lamps you buy lighting satisfaction which carries this "money-back" offer:

- ***We'll buy back, at the price you paid, any Sylvania Fluorescent lamps that do not, in your opinion, outperform any other fluorescent lamp you are now using, on the basis of uniformity of performance and appearance, maintained brightness and life.***

Learn, without obligation, how better lighting with Sylvania Fluorescent lamps can help improve production and lower your costs. Call your Sylvania Supplier, or write:

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60 Boston Street, Salem, Mass.

In Canada:
Sylvania Electric Products Inc. (Canada) Ltd.
University Tower Building, Montreal

SYLVANIA

. . . fastest growing name in sight

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

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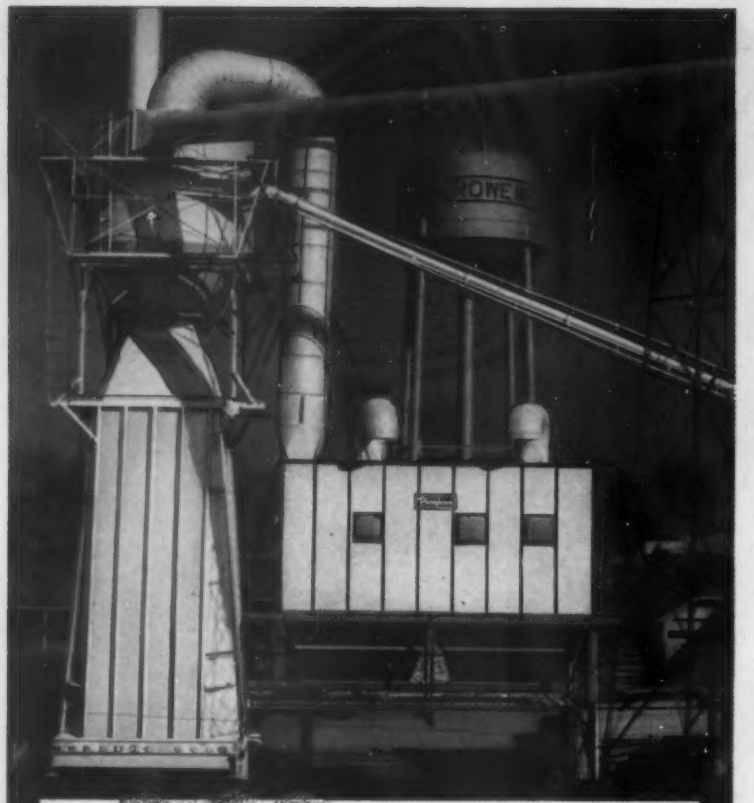


Dust makes it "hot" for Rowe!

Pangborn Dust Control saves Rowe over $12,000 a year in heating costs

Dust used to "make it hot" for Rowe Manufacturing Co., Galesburg, Ill., by posing a serious problem. Rowe, a large producer of wood products (like the Ro-Way garage door), was troubled by the great volume of dust created by its many woodworking operations. Today dust makes it hot for Rowe in a different way! Thanks to Pangborn Dust Control, collected dust now fuels the boilers that provide steam for power and heat. The dust collected by Pangborn Dust Control saves Rowe over $12,000 in heating costs annually! In addition, Pangborn has improved community relations, employee relations and plant cleanliness.

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Dry or Wet Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangbora Corp., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

For more facts circle 629 on Reply Card

as diesel engines, pneumatic tools, air compressors, refrigeration compressors, motors and generators, steam turbines and machine tools.

Here are several of the chapter headings in addition to those on the previously mentioned equipment: Running in new bearings, methods of lubricant supply, organization of a lubrication department, storage and handling of lubricants, the purification and reclamation of oil, and types of lubricants and their use.

Metal Processing

BARREL FINISHING by Ralph F. Enyedy. Size 10¼ by 7¼ in.; 255 pp; illustrated; cloth bound. Published by Reinhold Publishing Corporation, 430 Park Ave., New York 22, N.Y. Price $7.50.

TIME AND COST reduction are the ever present targets at which industrial people are constantly firing. Their ammunition is better equipment and more efficient processes and methods. In line with this attitude is the use of barrel tumbling for production deburring, polishing and coloring of metal parts. These aspects of barrel finishing are considered in this informative and helpful manual on the subject.

The handbook contains over 150 specification sheets on a variety of dimensioned parts. These include data for barrel finishing operations. Attention is also given to finishing room layout, finishing compounds and media, types of barrels, auxiliary handling equipment, self tumbling, chip tumbling, cleaning with sawdust, and other items.

Diesel Engines

DIESEL ENGINE PRINCIPLES and Practice, edited by C. C. Pounder. Size 8¾ by 6⅛ in.; 820 pp; illustrated; cloth bound. Published by the Philosophical Library Inc., 15 East 40th Street, New York 16, N.Y. Price $17.50.

TWENTY-THREE SPECIALISTS have collaborated in the preparation of the technical matter in this comprehensive reference book on Diesel engines. The editor of this work which was printed in Great Britain has had wide experience relating to design of this type of power plant.

The book, beginning with a section on theory of the compression-ignition engine is devoted not only to stationary equipment but also to units used in marine work and in vehicles. The dual fuel engine also merits attention in one of the twenty-six sections.

Among the items covered in the book are the following: exhaust systems, turbo-superchargers, transmission systems, bearings, causes and pre-

Reduce HOT WATER Generation Costs...

with the new

A.O.Smith Burkay "718"

HIGH RECOVERY WATER HEATER

Significant cost reduction in the heating of hot water for many plant needs can be made with the A. O. Smith Burkay System of Water Heating. A new addition to this famous line is the "718"—the water heater with "big job" capacity: 403 gallons per hour at 100-degree temperature rise, with an input rating of 420,000 BTU per hour!

By installing a "718" you can cut back the operation of your expensive boilers, reduce the size of your boilers; or in some cases dispense with them entirely . . . thereby reducing overhead, labor and maintenance costs. Furthermore, the large capacity of the "718" reduces the need for multiple heater connections.

For the plant restaurant, the Burkay "718" with the A. O. Smith patented Booster-Recovery System provides water at two temperatures simultaneously: 140 degrees for general-purpose needs and all of the 180-degree sanitizing rinse required by health authorities for the rinsing of dishes.

Packed with exclusive A. O. Smith design features that provide: all copper construction for clean, rust-free water; full combustion efficiency; accurately controlled water temperatures; instant response to hot water needs—this high recovery unit gives you *more hot water* at the *right temperature* for *less money* in *less time!*

Call the nearest A. O. Smith distributor for the full details; or write for Model "718" Specification Sheet.

"Plenty of Hot Water Pays All Ways"

Through research ...a better way

A.O.Smith CORPORATION

PERMAGLAS DIVISION • KANKAKEE, ILLINOIS

WRITE FOR COMPLETE INFORMATION ABOUT THE "718," TODAY

A. O. SMITH CORPORATION
Permaglas Division, Kankakee, Illinois, PE-256

Gentlemen: Please send me immediately full details on the "718."

Name..... Title.....

Company .....

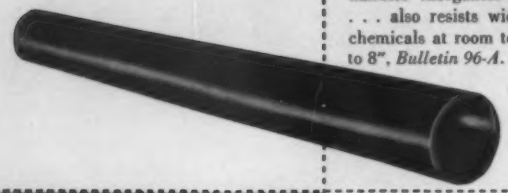
Address .....

City..... Zone.... State.....

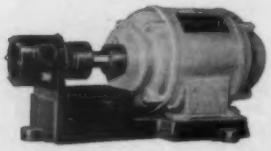
For more facts circle 630 on Reply Card

FOR HOT CORROSIVES:
ACE TEMPRON

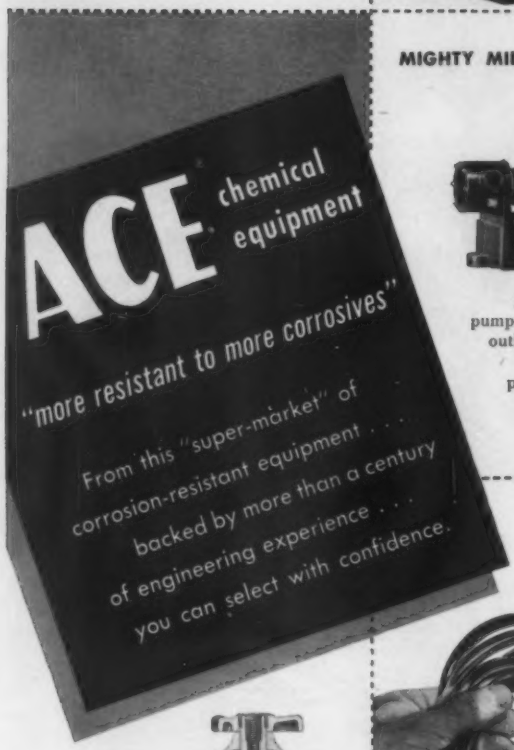
Heat-resistant nitrile hard rubber pipe handles inorganics at 250-275 deg. F. . . . also resists wide range of organic chemicals at room temperature. Sizes 1" to 8", *Bulletin 96-A.*



MIGHTY MIDGET
for pumping acids



Jabsco neoprene-impeller pump made of ACE hard rubber outlasts, out-pumps anything in its pressure, size and price class. Capacity from 15 gpm. at 22 ft. head to 5 gpm. at 72 ft. head. *Bulletin 97-A.*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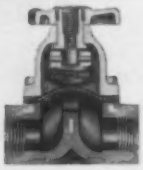
From this "super-market" of corrosion-resistant equipment . . . backed by more than a century of engineering experience . . . you can select with confidence.



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vention of crankcase explosions, fuel injection systems, and balancing of engine forces.

Professional Examinations

CALIFORNIA CIVIL ENGINEER and Engineer in Training Examinations. Size 11 by 8 in.; 289 pp including index; illustrated; paper bound. Published by A. E. Waegemann, 2833 Webster Street, San Francisco 23, California. Price $7.00.

EXAMINATIONS for professional engineer status in the State of California form the bases for this book. There are many solutions to problems; some of the explanations are closely detailed. True, the contents pertain particularly to Civil Engineering; however, some of this information is useful to exponents of other engineering curricula.

There is, for example, material included that pertains to structures, beams and concrete construction. Hydraulics also come into the picture quite a bit and there is attention given to building design, engineering economics, foundations, pipe lines, weirs along with other subjects.

Besides the solutions that have been presented to various types of problems in the early portion of the book, there are complete examination parts, each originally given in a four-hour period. However, none of the problems in these is worked out; the student is given an opportunity to test his proficiency.

Engineering Charts

DESIGN OF HEATING AND VENTILATING SYSTEMS by F. W. Hutchinson. Size 9¼ by 6⅜ in.; 308 pp including index; cloth bound. Published by the Industrial Press, 93 Worth St., New York 13, N. Y. Price $7.00.

ENGINEERING SCIENCE is the main concern of this book. The volume deals primarily with the type of problems that call for rationalization. This is in contrast to the use of engineering art in which standard formulas are selected to arrive at an answer. Accordingly, a good bit of attention is given to panel and solar heating, and airways design.

The book contains 96 full page charts in addition to explanatory text material. This is a time saving feature for the solution of complex equations. Graphs eliminate the need for calculation in many cases. The charts have an accuracy that is at least equal to that of the equation that was used for their construction.

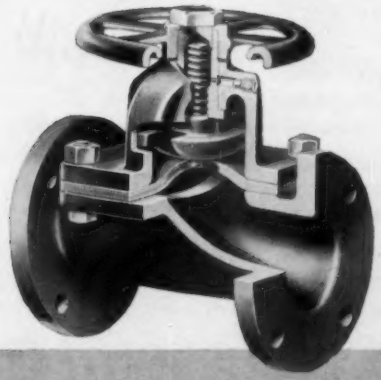
In this book, consideration is given to such items as: transmission losses, ventilation and humidification, heat losses from ducts, pipes and tubes.

9,121 ways to valve corrosive substances with HILLS-McCANNA valves

36 BONNET ASSEMBLIES	14 DIAPHRAGMS	27 BODIES
HANDWHEEL OPERATED—13 types including models with indicators, auxiliary handles, enameled bonnet and outside stem and yoke.	**RUBBER**—3 types including high acid/alkaline resistant, abrasion resistant and temperature resistant.	**CAST IRON**—ASTM Class 3 minimum.
QUICK OPENING—2 lever operated models go from full open to full closed in a 180° turn.	**NEOPRENE**—5 types including acid, alkaline, oil and heat resistant formulations, freeze resistant and white, noncontaminating formulations.	**CAST STEEL**—standard foundry finish.
SLIDING STEM—5 models to permit adaptation to a wide variety of operators.	**HYCAR**—acid, oil and heat resistant.	**CAST IRON, LINED**—choice of 8 linings including hard or soft rubber, neoprene, glass, lead, Saran and Lithcote.
EXTENDED STEM—2 models provide easier operation in difficult locations.	**TYGON**—acid resistant.	**CAST IRON, COATED**—Stalpic coated.
CHAINWHEEL OPERATED—1 model.	**COMPAR**—solvent resistant.	**ALLOY**—choice of 10 alloys including several types of stainless steel, Durimet, Everdur, Monel and Hastelloy.
AIR OPERATED—9 models offered with a choice of air cylinder or diaphragm motor operators.	**KEL-F**—acid resistant.	**ALUMINUM**—Cast.
UNBALANCED HYDRAULIC OR PNEUMATIC—1 model utilizing pressure on valve diaphragm to close, line pressure to open.	**POLYETHYLENE**—acid resistant.	**NICKEL**—97%+ pure.
MOTOR OPERATED—3 models providing a choice of electric motor operators.	**TEFLON**—maximum chemical resistance.	**PLASTIC**—Choice of 4 materials: polyvinyl chloride, Uscolite, Saran or polyethylene.

In this unmatched selection of operators, diaphragms and body materials is the answer to virtually every corrosion resistant valving problem. In addition, nearly 25 years of application of the Saunders Patent valve by Hills-McCanna has developed extensive experience records on the best way to handle thousands of corrosive substances. The combination of a complete choice of materials plus Hills-McCanna "know how" is your assurance of getting the *best* valve for your service.

Hills-McCanna diaphragm valves are offered in sizes from ⅜" through 14". Dependent on size and type of body and diaphragm materials, they will handle pressures to 150 psi, temperatures to 350° F. For specific recommendations send an outline of your corrosion resistant valving problem. To have full data at hand, ask for the Hills-McCanna valve catalog.



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Manufacturers of: Saunders Patent Diaphragm Valves • Chemical Metering and Proportioning Pumps • Force Feed Lubricators • Light Alloy Castings

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Why C-E Chose Mercury High-Bay

(Continued from page 106)

proximately a dozen or so can burn out and not be noticed too much at the working plane.

The maintenance parts room keeps twelve fixtures at all times, which are cleaned and have new lamps. When the approximate time comes, that the overhead cranes are not too busy, two electricians take the spare fixtures to the area to be relamped. One man unplugs and unhooks the burned out lamp fixture and lowers it to the man on the floor, who replaces it with a cleaned and relamped unit. The removed fixtures can then be cleaned and relamped in the shop when it is convenient to do so, and then are ready to replace others at a later date.

This system of lighting maintenance, when using separable reflectors and long life lamps is very economical and works very well. Incidentally, after approximately 5000 hours of burning time with the same lamps; the reflectors and glass enclosing covers, not having been cleaned, a drop of approximately only 7 foot-candles was experienced from the initial 32 foot-candle output. It was also found, that when the glass enclosing covers were opened, after over 6000 hours, the alzak aluminum inner reflector could be wiped clean with a dry rag. It had only a light oily film and a few dirt streaks on it. However, the complete fixture and glass cover are washed inside and out as standard practice.

Services of the various manufacturers of lamps, fixtures, transformers, ballasts, etc., which are available to all industries, were employed freely in planning this installation.

The old original 7 foot-candle lighting system was relamped with 750 watt R 52, reflector type lamps, and now makes an ideal stand-by system.

In summing up the economics of industrial high-bay lighting, the primary question should be, can we afford the system after we install it? The real cost of a lighting system becomes apparent only after the system is placed in operation. Therefore, considerations of the wiring methods, or voltages used are not of primary concern providing they are in accord with the national and local codes.

Type of lamp, and the reflector if used, plus a method of economically maintaining a nearly original foot-candle output, should be major concerns when designing high bay lighting systems.

"Push-Pull" Ventilation

(Continued from page 121)

shift operation over a period of approximately six months, the monetary savings on this basis will be $24.90.

A concrete example of the cost of tank ventilation in winter is as follows: A tank 8 ft long by 3.5 ft wide with a two-sided conventional exhaust would normally require a minimum exhaust rate of 200 cfm per sq ft of tank surface. The cfm rate would be 5600. To do the same job, a push-pull system using outside air supply would supply 1215 cfm and exhaust 2580 cfm. The net loss from the building with push-pull for the problem tank would be 1365 cfm. The saving of air on this one tank would be 3235 cfm (5600 — 1365). The saving in fuel per season on a one shift basis of eight hours would be (3235 ÷ 1,000) × $0.0249 × 1,000 = $80.60 per season.

Where it is applicable, and where considerable quantities of air must be exhausted, push-pull can give better control and pay for its greater cost in a short time out of fuel savings. It is possible for a shop operating in the temperature limitations that have been considered in this article to save $1,000.00 in fuel cost per season. This can be realized providing there is a minimum of 380 sq ft of tank surface and the system is used 8 hr per day.

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Instrumentation

(Continued from page 95)

which may be behind the visible miniaturized panel and use only indicators on the operating panel. This satisfies those who want to refer to records of the past hours to determine a trend.

Graphic boards utilize the miniature instruments located at a point in the flow diagram (Fig. 9) corresponding to the point in the process at which the measurement is obtained. The only excuses, and these are justifiable excuses, for using the graphic board are to: (a) economize on personnel; (b) expedite education of new operators; (c) condense operating information.

Methods of calling attention to an abnormal or unsafe operating condition as differentiated from the normal operating condition, is a study in itself. Either an unsafe or an abnormal operating condition may be brought to the attention of the operator on a centralized or a graphic board. Annunciator boards or little red lights and horns or bells which operate from alarm circuits may be incorporated into any control system.

In the final analysis, the operator is interested only in measurements when they deviate from the control point beyond a predetermined maximum or minimum. If this is the case, the only control board that must be watched or envisioned would be a board consisting of colored lights to designate an abnormal increase or an abnormal decrease.

Ideally, this abnormality would draw the necessary data to analyze the cause of the abnormality from a memory which includes all measurements. The simpler approach now being used to accumulate the recordings on standard instruments available to the operator for analysis.

Next step is complete automation or, the closing of the control loop by inserting equipment that will accept all the intelligence, recognize a deviation, and select a correction. This is a costly step that requires thought.

When it is justified, the pay-out can be very rapid and well worthwhile. The initial steps in setting up the problem are no different; but they must be very complete so that a specialist in this equipment can determine its advisability.

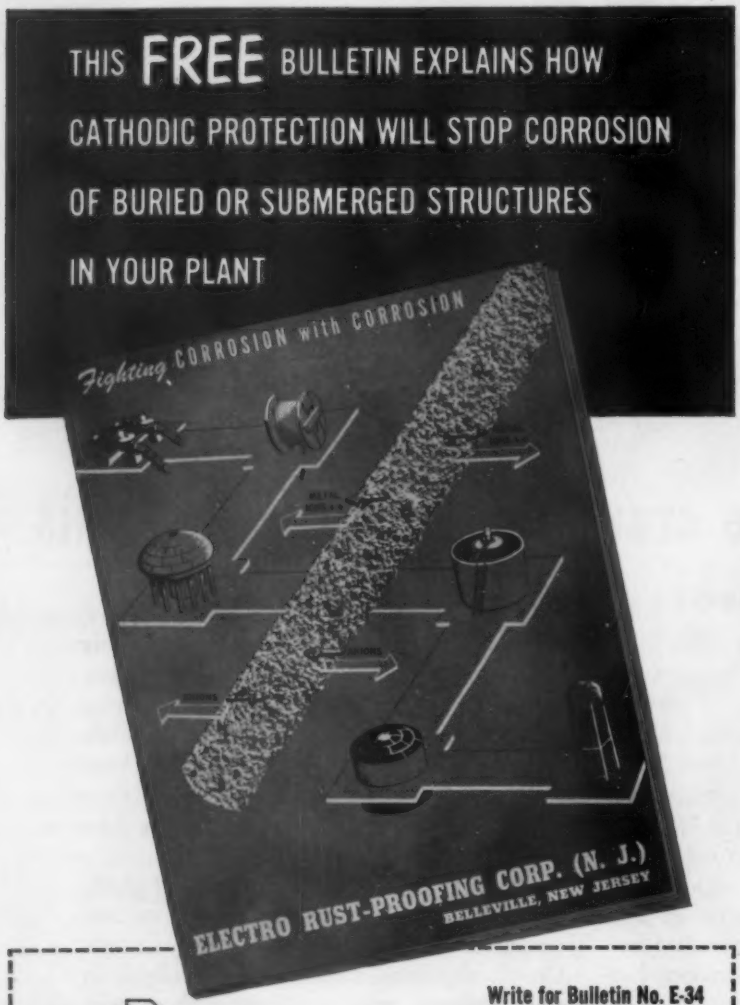
Everything that has been discussed so far has concerned tools for you to use in order to present your problem. You must realize that this is a bare outline, but it is a basis. When the entire picture has been developed, you must decide upon who will engineer the job. Several choices present themselves. They are: (a) existing personnel; (b) instrument companies; (c) consulting instrument engineer; (d) design engineering company.

Assuming the existence of an instrument engineer or instrument department, choice (a) is the most economical. The advantages of an instrument department were discussed in the September and October, 1954, issues of Plant Engineering. The well-organized department should be capable of engineering any instrument job to complement any plant project being handled by the other engineering services.

Well-informed instrument men are able to select the best instruments from the lines offered by various manufacturers. The instrument department should excel in a revision or modernization project due to familiarity with operating problems.

Instrument companies offer a wide range of engineering services. Many instrument companies have developed various processes. Products of this specialized study should be used to advantage. The advantages of having equipment of the same make throughout the plant should not be overlooked.

These advantages are: simplification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E-34

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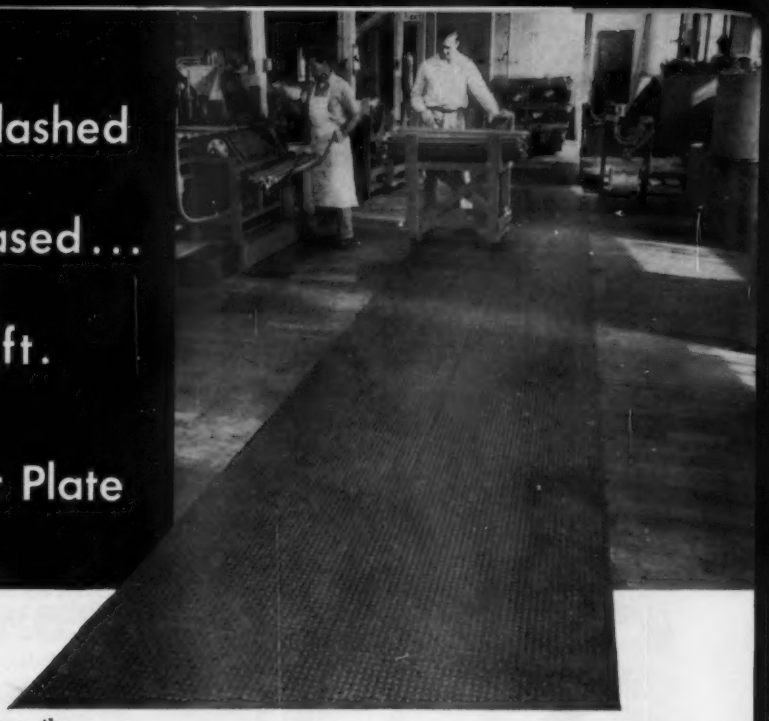
Maintenance costs slashed ... safety hazards erased ... with 50,000 sq. ft. of *Multigrip* Floor Plate



THE STANLEY HOME PRODUCTS plant, East Hampton, Mass., is a busy place. Hour after hour hand trucks and fork lifts shuttle up and down the aisles carrying production materials and finished products. Heavy traffic like this subjects floors to tremendous wear. In fact, the old wooden aisles in the Stanley plant developed deep ruts, making it difficult to maneuver trucks. The ruts also created a safety hazard due to splintered wood and sprung nails. Repairs to the aisles were frequent . . . and expensive!

Flat-topped risers on Multigrip Floor Plate guarantee traction for wheels and feet, helping to eliminate slipping accidents in danger areas. It's ideal for use on stairs, aisles and platforms. This Stanley Home Products plant uses 50,000 square feet of Multigrip to protect aisles.

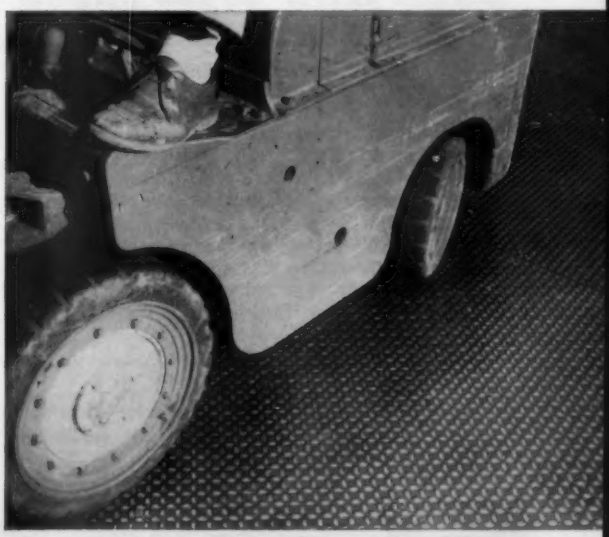
RUGGED AND SAFE

A floor covering was needed that was rugged enough to stand up under severe wear, wouldn't chip, crack or splinter and at the same time, offered positive traction to both feet and wheels. Many mattings were tested but only USS Multigrip Floor Plate met ALL of the requirements. Now, 50,000 square feet of Multigrip cover all aisles in the production area.

IN SERVICE SIX YEARS, this Multigrip shows practically no signs of wear. Stanley Home Products first used Multigrip in 1949. It stood up so well under terrific abuse that they have since covered ALL production aisles with Multigrip Floor Plate.

IDEAL FLOOR COVERING

Multigrip is made of rugged steel to resist wear, even under the most severe traffic conditions. Evenly-spaced, flat-topped risers give positive traction to busy feet and wheels. Because Multigrip can't soak up oil or grease, cleaning is no problem. A broom or hose is all that is needed . . . and Multigrip's special design allows drainage in *all* directions. Eliminate danger areas in your own plant by safe-treading with USS Multigrip Floor Plate. Installation is simplified because Multigrip is available in large plates and may be bent or formed where necessary. On aisles, ramps, loading platforms, stairs and entire floor areas, USS Multigrip Floor Plate is safe, practical and durable.



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New type wrenchless Speed Chuck operates easily, quickly, guaranteed to grip pipe or rod tightly—forward, reverse; jaws have replaceable insert teeth for longer life . . . Independent die heads, cutter, reamer swing up out of way when not in use . . . Quick-opening die heads—1 Quadri and 2 Dual heads for ¼" to 2" (⅛" available) . . . quick size change right in machine . . . Power for geared tools to 12". Many other efficient worksaver features. See it, try it . . . buy it—at your Supply House.

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The Ridge Tool Company, Elyria, Ohio, U.S.A.

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of operating and maintenance training; need for minimum stock of repair parts; and individual responsibility for successful operation of the instrumentation. A drawback is that few instrument companies are in a position to have a man or men sitting in your engineering department to roll with the punch when inevitable revisions in overall design pop up.

It is difficult for an outside man to follow the piping, instrument piping, panel board foundations, electric department contacts, utility supplies and dozens of other problems which present themselves daily during the progress of the design.

Your company may be able to take advantage of an instrument consultant. This should be done only if you do not see fit to support an instrument engineer. The consultant is a product of some well organized instrument department.

He formerly usually headed his own department, but feels that he can be more valuable to a larger ring of clients rather than to one employer. He has kept in touch with the products of all manufacturers so is in a position to select the best from each without prejudice.

This man can be economical to you because he is in a position to accept jobs, large or small, without the tremendous overhead costs which load a design engineering company. It may be wise to hire this man to act as liaison when a large job is being engineered by a design and construction company.

Design and construction companies are a necessity. Very few operating companies have a continuous construction program which warrants supporting all of the engineering services which must be set up for one large project.

The operating company cannot afford to hire a large group of specialists or as an alternate, train men for the multiplicity of responsibilities of a project. The design and engineering company has the opportunity of signing up enough projects to justify keeping trained personnel.

Careful attention to the preliminary planning by use of the tools discussed will make it possible to proceed to the actual engineering so that construction may be done in an economical manner with a minimum of revisions in basic thought. From this foundation of planning, it is necessary to obtain the services of personnel with ability to envision the most effective systems and instrumentation. They must have knowledge of the wide range of dependable instruments offered by reputable manufacturers so that the correct instrument may be selected and placed in the proper niche.

Plastisols — Muscle Men in War on Corrosion

(Continued from page 115)

new formulation produces thick single-coat dry films, with standard equipment and techniques. It can be applied at room temperatures to cold vertical surfaces in dry film thicknesses of 25 mils without sagging thereby simplifying problems of maintenance for the plant engineer.

As an example, the plating division of an automobile company used this sprayable plastisol on rinse and electrocleaning tanks and found it was able to protect the outside as well as the inside of the tanks for less money than it formerly cost to line just the interiors with plastic sheets. Moreover, the plastisol provided seam-free, tightly bonded coatings which assured against undercutting.

Another example of effective protection plus economy is shown by a plant which compared the performance of plastisol-lined tumbling barrels with that of barrels lined with synthetic rubber. Subjected to the roughest kind of production for nine months, the plastisol proved more durable than equal thicknesses of rubber—yet cost only half as much.

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50	51	52	53	54	55	56
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64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91

BULLETINS

101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	
119	120	121	122	123	124	125	126	127	
128	129	130	131	132	133	134	135	136	
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DATA FILE

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FEBRUARY, 1956
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PLANT ENGINEERING

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1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49
50	51	52	53	54	55	56
57	58	59	60	61	62	63
64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91

BULLETINS

101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	
119	120	121	122	123	124	125	126	127	
128	129	130	131	132	133	134	135	136	
137	138	139	140	141	142	143	144	145	
146	147	148	149	150	151	152	153	154	
155	156	157	158	159	160	161	162	163	
164	165	166	167	168	169	170	171	172	
173	174	175	176	177	178	179	180	181	
182	183	184	185	186	187	188	189	190	
191	192	193	194	195	196	197	198	199	
200	201	202	203	204	205	206	207	208	
209	210	211	212	213	214	215	216	217	

DATA FILE

301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324	325	326	327	328	329	330
331	332	333	334	335	336	337	338	339	340	341	342	343	344	345
346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
376	377	378	379	380	381	382	383	384	385	386	387	388	389	390
391	392	393	394	395	396	397	398	399	400	401	402	403	404	405
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466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492	493	494	495

ADVERTISED PRODUCTS, SERVICES

501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532
533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564
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BULLETINS

(Begins on page 21)

LUBRICANTS, LUBRICATION

159 Extreme Service Lubes—This eight-pp bulletin describes and gives technical information on lubricants and greases for extreme service. Tells qualities and specific industrial uses of multi-purpose greases, outside gear and track roller lubricants, chain and gear oil, anti-seize compound, an air-dry lubricant, others. Jet-Lube, Inc.

160 Lubrication Studies—Eight-pp "Studies in Centralized Lubrication 1955" presents a few case histories indicating experience of plants using centralized lubrication. They cover installations resulting in reduced wear on open gears, improved turbine performance, other benefits. The Farval Corp.

MECHANICAL POWER TRANSMISSION

162 For Drive Efficiency—Bulletin H-2104, "How to Care for Jr.," describes a comprehensive program for keeping company's V*S Jr. drives in operation at peak efficiency. Prepared primarily for maintenance engineers, bulletin explains service and parts available for these electronic variable-speed drives. Tells how a preventive maintenance program may be set up in relation to such factors as number of units in operation or specific type of operations. Reliance Electric & Engineering Co.

163 Fluid Drive—Bulletin 9619, 8-pp, describes the Type VS Class 2F Gyrol fluid drive for diesel engine applications, covering construction and operational features, and operating characteristics. Application in compounding multiple engine drives is also discussed and installation photos are included. Section drawing illustrates operation, and specifications, installation drawings, and cooler selection tips given. American Blower Corp.

164 V-Belt Data — Bulletin 5-403 covers manufacturer's Multi-V belts, including Grommet V belts, high capacity static conducting belts, oil-resisting V belts, double-V belts. Stresses longer service, other advantages of these belts, provides chart showing standard and high capacity V belt numbers, sizes and pitch lengths. An interchange list for Multi-V belts is included. B. F. Goodrich Co.

165 Split Roller Bearings—Construction details, assembly and advantages of a line of roller bearings "split right down to the shaft" are provided in 20-pp Catalog 542. Gives standard ranges, discusses special designs and tells how to select proper bearing. Specifications for medium, heavy and extra-heavy duty types are included, also detailed drawings and photos. Cooper Split Roller Bearing Corp.

AIR CONDITIONING, DUST CONTROL, DEHUMIDIFYING

170 Central Air Conditioning — Development and use of self-contained central station air conditioning is covered in 36-pp booklet Form 2023. Liberally-illustrated, booklet traces history of comfort cooling in non-technical terms from the days of the Romans. Discusses company's RK unit which contains, in one casing, all elements of a central air conditioning plant up to 60 tons in cooling capacity. Describes refrigeration cycle and its application in "built-up" systems and in packaged air conditioners, and tells how principle has been applied. United States Air Conditioning Corp.

171 Air Conditioners—Full information, including unit specifications, on company's redesigned line of water-cooled packaged air conditioners is given in 8-pp Form L-241. Explains and illustrates features contributing to operating economy and longer life. Discusses installation. Airtemp Div., Chrysler Corp.

172 Dust Filter—Design, application and benefits of company's AC dust filter are described in illustrated 26-pp Bulletin 559. Filter performance curves, principle of air filtration, filter comparison charts, woven vs felted filtering media are featured, along with technical data on design, capacity ratings, dimensions, velocity, air volume and pipe friction tables. Installation photos and drawings of typical equipment layouts are included. The Day Co.

173 Sprayed Coil Dehumidifiers—Twenty-pp Bulletin 7827, on central station type sprayed coil dehumidifiers, features a section of application data covering selection and use of these units. Water dilution, high humidification, evaporative cooling and sizes selection are treated. Also included are symbols, formulas and special tables and curves. The catalog also outlines dimension and construction features of the sprayed coil units. Installation drawings give basic dimensions for various size units. American Blower Corp.

PROTECTIVE CLOTHING

174 Acid-Resistant Apparel — This 16-pp catalog on acid-resistant and caustic-resistant work clothes, includes sections devoted to garments of Orlon and Dynel, along with a graphic analysis of particular advantages and applications of each fabric. Additional pages describe a new group of lint-free acid-resistant work clothes of 100 per cent Orlon, desirable in certain operations, such as electronics, pharmaceutical, other industries. Laboratory data. Worklon, Inc.

175 Protective Clothing—This 12-pp illustrated catalog features lightweight, long-wearing and easily-cleaned industrial clothing, including Koroseal-coated canvas gloves for use where extra toughness is needed for handling abrasives. Also described and pictured are raincoats, work suits, aprons. Selection information is included and there's a chart giving properties of industrial gloves, resistance of coatings to chemicals. B. F. Goodrich Co.

On the facing page are postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

HOSE AND DUCT

176 Flexible Metal Hose—Twelve-pp Catalog 152 features engineering data on the complete line of Flexon flexible metal hose. Covers full range of flexible metal hose products, along with complete coupling data. An easy four-step metal hose selection guide is included. Flexonics Corp.

177 Hose and Duct—Construction and general information on Flexaust hose and Portovent duct is presented in 6-pp Bulletin 60. Also lists industrial prices for various sizes and types, and suggested uses. The Flexaust Co.

HEATING, HEAT TRANSFER

178 Process Heating Equipment—Bulletin DV presents process heating equipment for use with Dowtherm A and E, Para-Cymene, Arclor 1248 and heat transfer oil. Described and illustrated are vaporizers (both packaged and field erected units), electrically-heated vaporizers and forced circulation liquid heating and cooling units which can be used to provide a wide range of accurately controlled temperatures at low pressures. Union Iron Works.

179 Heat Transfer Equipment — Catalog 552, 32-pp, contains simplified performance curves covering converters, instantaneous heaters, and process equipment. Details on how to select heat transfer equipment are presented, dimensioins given, and selection curves explained. Also covers reliable comparisons of various types of shell and tube heat exchanger equipment. E. C. Cooley Co.

180 Plate Fin Exchanger—Design and application data on company's plate fin exchanger—a compact crossflow heat exchanger with extended surface on both sides—is presented in this 8-pp illustrated bulletin. Results of moving air oxidation and aqueous corrosion tests are pictured. The Griscom-Russell Co.

181 Heat Exchangers—Twelve-pp Bulletin 537 gives product data on two impervious graphite heat exchangers—company's Cubical and Cross-bore units. Explains features of these two exchangers and includes cut-aways, scale drawings, installation photos. All standard models are tabulated to show sizes, transfer surfaces, approximate weights. Falls Industries, Inc.

182 Heat Exchanger Tubes—Bulletin TB-329B, 8-pp, describes heat exchanger and condenser tubes, covering pertinent information on popular grades of carbon, alloy and stainless steel heat exchanger tubing, both seamless and welded. Also includes a special section dealing with the problems of installing heat exchanger and condenser tubes by the expanding method. The Babcock & Wilcox Co.

METAL FASTENERS

184 Stainless Fastener—This 52-pp stainless fastener data book is announced as the most comprehensive on the subject. First part of the book includes illustrations, thread and size specifications, and availability in a variety of corrosion resistant metals of 40 basic fastening devices (screws, bolts, nuts, washers, rivets). Second part consists of engineering data relating to composition, properties, applications, and weights of stainless steels, other tables. Allmetal Screw Products Co., Inc.

185 Steel Fastenings—The 66-pp first edition of this manufacturers semi-annual catalog combines stock lists, price lists and discount sheets on stainless steel fastenings all in one handy reference manual. In it, all pertinent

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166 Piping Flexibility Analysis — How processing and power piping costs can be reduced—in materials, design, and construction—is the subject of this 12-pp brochure. Details method of piping flexibility analysis for evaluating stresses, reactions and deflections in complex piping networks. Analysis involves development and solution of simultaneous equations for determining forces and moments in the piping system. From these forces and moments, stresses and deflections are calculated. The M. W. Kellogg Co.

167 Heat by Radiation—Problems connected with heat flow, conservation of fuel for heating or of power for air-conditioning, and maintenance of comfort in summer and winter are discussed in 48-pp "Heat Flow by Radiation in Buildings." It contains almost 100 illustrations including charts, diagrams, tables, photos; scientific experiments. Covers simplified physics of heat flow, installation techniques, and typical projects. Installation techniques for insulating wood joists and studs, steel beams and trusses, ducts, pipes and masonry walls included. Infra Insulation Inc.

168 Care of V-Belts—"Care and Maintenance of Industrial V-Belts" is a 14-pp manual covering: design of new drives; double matching; installation of belts; how V-belts grip; importance of tension; drive alignment; cleaning, and storage. A V-belt service chart, showing typical causes of belt failure, is featured. Photos show what belts look like after failure due to such causes as oil deterioration, cover fabric rupture, slip burn, ply separation, ruptured cords, worn belt sides, snub break, distorted belt, abrasion and base cracking. Ways to prevent these causes are outlined. The B. F. Goodrich Co.

169 Silicone Products—This 12-pp reference guide describes almost 150 commonly used silicone products, 18 of which were introduced within the last 12 months. Products are grouped by physical form (fluid, compounds, greases, resins and rubbers) and cross-indexed by usage (dielectrics, defoamers, damping media, etc.), enabling them to be located by what they do—as well as by what they are. Bulletin is illustrated with charts, tables, graphs and application photos. Dow Corning Corp.

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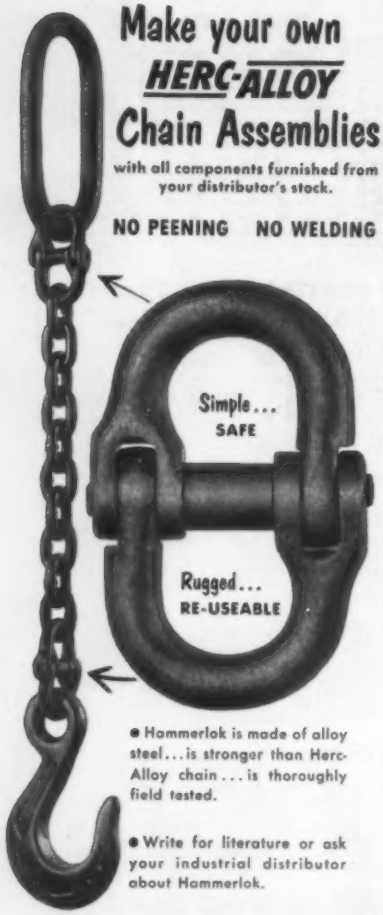

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BULLETINS

(Begins on page 21)

data on each item is printed on one line, including net prices in various quantity brackets. Listings include over 9000 items and sizes in different stainless analyses, covering screws, nuts, bolts, pins, washers, others. Anti-Corrosive Metals Products Co., Inc.

MACHINE SHOP AND METAL WORKING EQUIPMENT

186 Automatic Drilling—Catalog 55-D, 24-pp, covers automatic drilling and tapping units and accessories and offers a helpful and informative guide to improving automatic drilling and tapping set-ups. Tells how to evaluate basic drill unit requirements for automatic drilling, tapping, reaming and related operations. Includes photos and drawings illustrating important features, installation and operation. Advantages are listed, along with specifications, and typical applications are shown. Dumore Precision Tools.

187 Cutter—Operating and construction features of the No. 50 Travograph oxyacetylene multiple-torch, shape cutting machine are detailed in 20-pp Catalog 804A. Complete information is included covering accessories such as tracers, regulators, gas distribution systems, the multi-bevel unit, cutting torches and tips. Air Reduction Co., Inc.

188 Carbide Tools—Catalog 850C contains 12-pp of charts and descriptions on various types, sizes and styles of standard and special carbide tipped tools offered by this company. In addition to specific information, it contains data on carbide tipped tools in general and many illustrations of their proper application. Besly-Metro Div., Besly-Welles Corp.

189 Vibration Mountings — Catalog SS-55 describes heavy-duty general-purpose steel spring vibration mountings which combine characteristics of steel springs with damping, sway and thrust control elements. Describes construction, methods of damping excursion as well as controlling sway and thrust. Load capacities and dimension tables, illustrations of typical installations and engineering services are also described. Industrial Div., T. R. Finn & Co., Inc.

190 Power Shears—Outstanding features of company's pivoted blade power shears are illustrated and described in this comprehensive bulletin, Form 2011-F. 16 pp. Photos point out design features and descriptive paragraphs cover various components. A cutaway view shows details of operation. Clearance dimensions and specifications are tabulated. The Cleveland Crane & Engineering Co.

191 Packaged Presses—Design features of company's line of multiple point enclosed presses are illustrated and described in 32-pp Catalog 11B. Six basic types of presses, from 200 to 2500 tons are featured; two and four point single action presses, two and four point double action presses, a four-point single action underdrive press, and a four-point triple action underdrive press. Complete specifications and dimensions are also included. E. W. Bliss Co.

192 Colloidal Dispersions—How "dag" dispersions of colloidal graphite and molybdenum disulfide can cut costs in a variety of metalworking operations is described in Bulletin 426. Details methods of application, and the contribution of such products as Aquadag, Glydag, Oildag, and Prodag to metalworking operations; gives diluent ratios required in each instance. Acheson Colloids Co.

PLASTICS

193 On Polyester Film—Booklet MB-4, 8 pp, gives uses and properties of Mylar polyester film. Illustrated by photos and charts, booklet cites examples of industries where this plastic film is a preferred material. Included is a chart detailing characteristics of Mylar which have permitted design improvements and cost reductions. The story of Mylar in the electrical industry is among those outlined. A table lists available types and gages. Film Dept., E. I. du Pont de Nemours & Co.

194 Fire-Resistant Plastic—Advantages of Hetron permanently flame-resistant polyester resins are stressed in illustrated Bulletin 59. Lists characteristics and suggested applications, and tabulates typical properties. Other charts show flame spread of Hetron and comparative physical characteristics. Hooker Electrochemical Co.

195 Pertaining to Plastics—Recent contributions to plastics design, reduced production costs and improved performance are described in two illustrated brochures. "The Plastics Story," (Bulletin CDP-673) tells how molded plastics can aid in product development and pictures some applications. Bulletin CDP-672, "Fabricated Silicone Rubber Parts," tells of fabrication of these parts for industrial needs and outlines uses of four classes of silicone rubber compounds. General Electric Co.

METAL FINISHING

196 For Barrel Finishing—Four classes of precision barrel finishing compounds for a wide range of barrel finishing operations, from heavy deburring and cutting to regular deburring, burnishing, and cleaning are described in this set of four illustrated brochures. Guide tables for correct finishing of metals, plastics, castings and parts are included for each compound. Newton Industries Inc.

197 Steel Shot—Eight-pp Bulletin 89B, on a cast steel, heat treated blast cleaning and peening abrasive, includes a tabular comparison of characteristics of various metallic abrasives. Also discusses factors important to economical and efficient consumption of abrasive, and gives performance data on steel shot from various industries. How the shot is packaged and how shipments are made are also detailed. Wheelabrator Corp.

198 Abrasive Separators—Eight-pp Bulletin 1003 stresses importance of proper blast cleaning abrasive separation to efficient cleaning room operations. Describes four types of separators for handling from 33,000 to 320,000 lb-hr of abrasive. Photos and drawings show principles of operation and types of equipment available. Pangborn Corp.

OTHER EQUIPMENT

199 Water Tube Boilers—This 12-pp catalog describes packaged water tube boilers, capacities to from 8000 to 50,000 lb per hour. Interesting as well as informative, this booklet uses color and illustrations to amplify text. Gives complete data and dimensions for boilers designed for firing oil or gas or both. Superior Combustion Industries, Inc.

200 Double-Faced Tapes—Application suggestions for double-faced tapes are featured in this brochure. Describes its versatility in adhering metal to rubber, rubber to cloth, cloth to wood, etc. Also provides data on two types. Permacel Tape Corp.

201 Seals for Process Pumps—Fully illustrated with sectional drawings and cutaways, this 12-pp booklet details several types of Mechanipak seals for process pumps. Gives information on recommended services and seal parts and their functions. Also provides general data on these self-contained seals which offer quick installation and long service. Gives details of company's spare parts plan. Garlock Packing Co.

202 Power Sweepers—Bulletin S-100 describes company's complete line of power sweepers, stressing advantages in terms of savings achieved through use of these units. Contains table showing comparative costs on hand sweeping and power sweeping. Wilshire Power Sweeper Co.

203 Glass Fiber Products—Microlite and super-fine glass fiber insulation for heat control and sound absorption is described in Form WAF-1. Performance and conductivity charts for insulating blankets are given, along with properties and uses for acoustical applications and air duct installations. An acoustical baffle is also covered. L.O.F. Glass Fibers Co.

204 Refractories for Furnaces—Covered in 32-pp Form 69 is the entire range of this manufacturer's refractory products for the industrial furnace field, including foundry and

BULLETINS

(Begins on page 21)

steel mill furnaces. In addition to descriptions and illustrations of typical applications, a valuable material application chart is included. Plibrico Co.

205 **Effective Ash Discharge**—Bulletins 1753 and 1653 describe and illustrate Nuvaflow Fluidizers for ash storage bins. These units feature a development which slowly introduces low pressure air in the bottom of the ash storage bin, liquidizing the entire base of the ash pile so the ash flows uniformly out of the bottom discharge outlet into unloading equipment. United Conveyor Corp.

206 **For Sub-Zero Service**—Bulletin TB-357, 6-pp, provides information pertaining to tubular products intended for sub-zero temperature applications. Lists typical applications, includes table of properties and characteristics. Tubular Products Div., The Babcock & Wilcox Co.

207 **Tracing Templates**—This portfolio contains 48 8½ by 11 in. tracing templates, prepared scale full size, and available for tracings of all sizes of this company's strap clamp assemblies, malleable and aluminum hand knobs, speed handles, speed bar knobs, revolving clamp assemblies and swing clamp assemblies. They are printed on transparent paper, so you trace only the proper size component. In addition, portfolio contains an angle chart which gives formulas for finding functions of angles and a chart showing decimal equivalents of standard drill sizes. Jergens Tool Specialty Co.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 201-202.

208 **Chlorine Feeder**—Bulletin 840-L23B describes a low-cost volumetric chlorine gas feeder, equipped with automatic safety features, and combining qualities of accuracy and dependability. Informative sections on operation, description, methods of control, safety features, plus photos and flow diagrams describe Model EVS Chlorinizer. Builders-Providence, Inc.

209 **Glassed Steel**—The corrosion resistance of glassed steel to five acid solutions—acetic, nitric, sulphuric, hydrochloric, and phosphoric—is described in 12-pp Bulletin 928. Factors affecting resistivity of glassed steel are reviewed, and how these factors apply specifically to the various acid solutions are detailed. Influence of temperature, concentration, operating cycle and other ingredients are summarized in chart form. The Pfaudler Co.

210 **On Moisture Measurement** — How to measure water vapor in air and other gases is the subject of this informative 12-pp booklet. Discusses gravimetric, dew point and wet and dry bulb methods as well as some less used and even experimental schemes. Pittsburgh Lectrodryer Corp.

211 **Barometric Condensers** — Form 9012-A describes company's barometric steam condensers of the disc-flow and ejector-jet types. Discusses such advantages as simplified construction which results in low cost maintenance, and illustrates typical installations. Cutaway drawings point out important design and operation details. Ingersoll-Rand Co.

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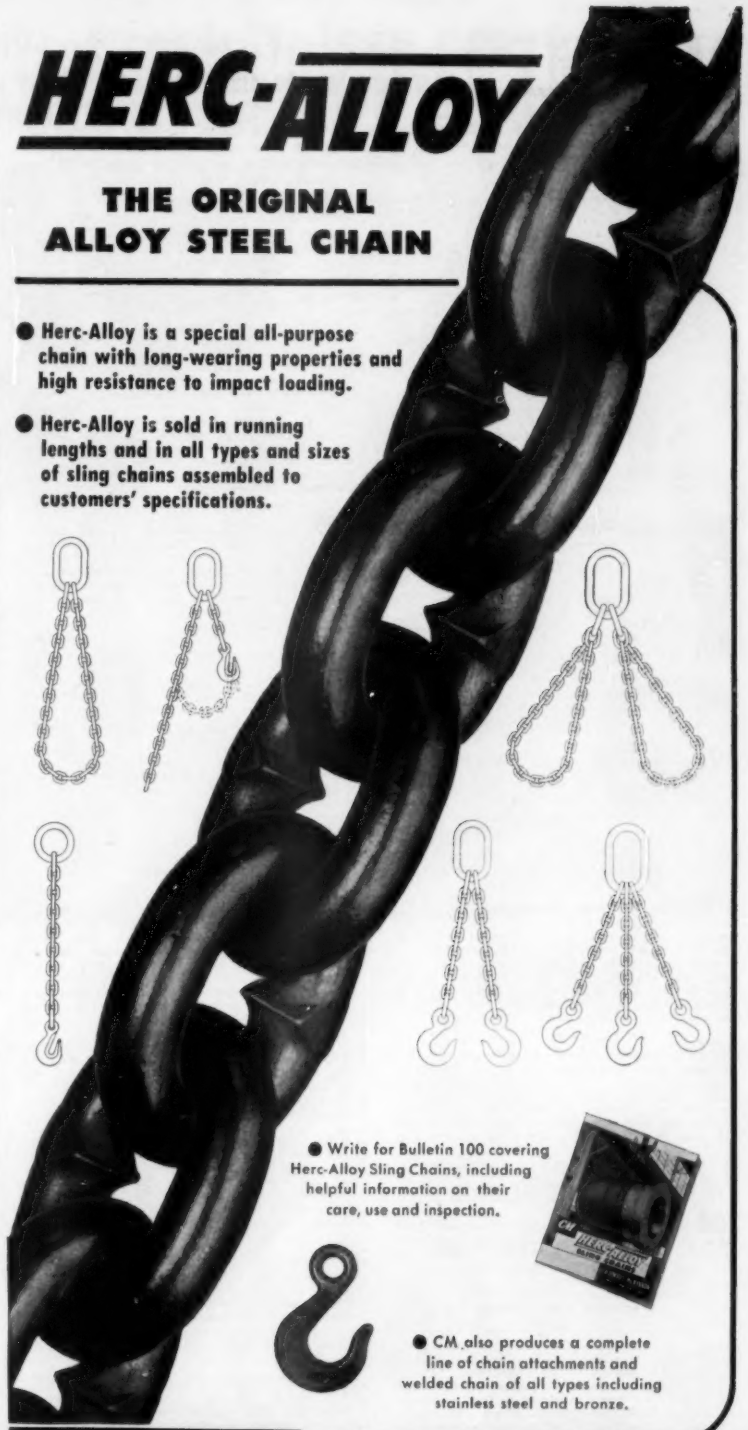

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MAINTENANCE

301 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instruction for applying them. Flexrock Co.

302 Better Floor Care — This illustrated folder describes products designed to aid efficient floor care. Lists combination scrubber-vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers and cleansers. Finnell Systems, Inc.

303 Cleaning Problem Solutions—Illustrated Bulletin 154, 12 pp, presents information on a wide range of cleaning methods and shows equipment available. Special emphasis is placed on the stationary vacuum cleaning system and its long-run economy in many installations. The Spencer Turbine Co.

304 Industrial Vacuum Cleaner—Advantages of using company's floor-type vacuum for industrial cleaning jobs are stressed in this illustrated bulletin. Describes operation, points out typical applications, and includes dimensions and specifications. Handling Devices Co., Inc.

305 Insulation Coating—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe. J. W. Mortell Co.

306 Guide to Rust Prevention—The 24-pp general catalog provides a treatise on rust prevention. Features 94 color chips of manufacturer's products and includes instructions for surface preparation and application of primers, short- and long-oil types, machinery and implement finishes, chemical and heat resistant types, sealers, oil field finishes, thinning oils and floor and masonry coatings. Rust-Oleum Corp.

307 Protective Paints—Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for wood and metal. Cellulose Products Dept., Hercules Powder Co.

WIRE ROPE, SLINGS

308 Sling Chain Handbook—Illustrated Data Book 100, 32-pp presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights, and working load limits under many conditions. Columbus McKinnon Chain Corp.

309 Sling Handbook—The 64-pp Tuffy Sling Handbook is replete with illustrations, charts and diagrams describing 16 factory fitted slings and nearly two dozen standard fittings available for slings, including several which are recent additions to the line. Book contains a complete rigger's manual, shop chart of ratings, an engineer's notebook and standard signals for directing operations of overhead traveling cranes and derricks and locomotives. A new development featured is the steel ferrule splice now on all Tuffy slings, which affords safety and other advantages. Union Wire Rope Corp.

310 Wire Rope Assemblies — Catalog 5201, 22-pp, describes company's wire rope assemblies, used for operating controls, as a part of machinery and equipment, or for slings and hoists. Gives general applications for various types of wire rope assemblies, and includes specifications, ordering details. Macwhyte Co.

CONSTRUCTION

311 Aluminum in Architecture—This 32-pp booklet provides information on use of aluminum, and of special interest is a discussion on architectural colors for aluminum exterior surfaces. Also describes basic types of aluminum finishes—satin, sandblast, bright, and "as fabricated." There are drawings and details of copings and gravel stops; curtain wall products, including facings, panel assemblies and wall units; industrial roofing and siding, weatherside and underside fasteners; trim and molding; sheet, plate, foil, pipe, rod and bar stocks; and structural shapes. An alloy section lists mechanical properties of applicable alloys. Aluminum Co. of America.

312 Panel Wall Construction—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q-35-55. Includes installation photos, diagrams, specifications, as well as drawings pointing out structural details. H. H. Robertson Co.

313 Glass Block Fenestration—The natural ventilation characteristics of glass block fenestration are presented in this illustrated report of a test project. In some 88 pages, report covers sun hoods, window types, dual outlets, air speeds, double loaded ventilation below window sill. Test data is summarized and recommendations included. Kimble Glass Co.

314 Heat Absorbing Glass—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating costs. Mississippi Glass Co.

315 Basic Roofing Information—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

316 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

317 Steel Floor Plate—Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. Typical uses of the floor plate are pictured. United States Steel Corp.

318 Steel Grating and Treads—Bulletin 2486, 16-pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety, pictures applications, and includes specifications, photos and diagrams. Blaw-Knox Co.

319 Metal Grating Handbook—Sixteen-pp Form 500 is data and specification manual covering all types of grating, open steel floor armor, stair treads, vessel liners, decking and drain grates. Contains safe load tables for basic types of gratings, panel width constant charts, tables on standard widths and types of steel treads, types of anchors used for grating. Klemp Metal Grating Corp.

320 Air Tools, Paving Breakers—These two bulletins describe company's latest models of paving breakers and air tools for plant construction and maintenance work. Bulletin PB1 gives features and specifications on heavy-duty, medium-weight and lightweight paving breakers, as well as tools for use with them. Bulletin ST-100 describes and gives specifications for clay spaders, trench diggers and backfill tampers. Gardner-Denver Co.

321 Brick Floors—Advantages of brick as a floor material are pointed out in this illustrated bulletin, 3h/Dr. Stresses such qualities as handsome appearance, excellent sanitary properties, resistance to acids and alkalies, durability, easy cleaning. Application photos included. Drehmann Paving and Flooring Co.

TOOLS, WELDING, AND MACHINE SHOP EQUIPMENT

322 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

323 Portable Electric Tools — This 1955 Standard Catalog, Form 10, 24 pp, features company's line of portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners, and others. Photos and full specifications included. The Black & Decker Mfg. Co.

324 Where to Use Your Stud Driver—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

325 Pipe Tool Ordering Guide — Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

326 On Spot Welding—"Spot Welding from One Side—With a Portable Gun," 12-pp, describes an inert-gas-shielded tungsten-arc spot welding process. Over 30 tables, weld cross-section and application photos, drawings and graphs are included. Sections of text cover when to consider spot welding from one side, how the equipment operates, standards and test procedures, factors affecting weld. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

VIBRATION CONTROL

327 Improved Machine Mounts—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased machine mobility, reduce maintenance costs, and lessen noise. Barry Controls, Inc.

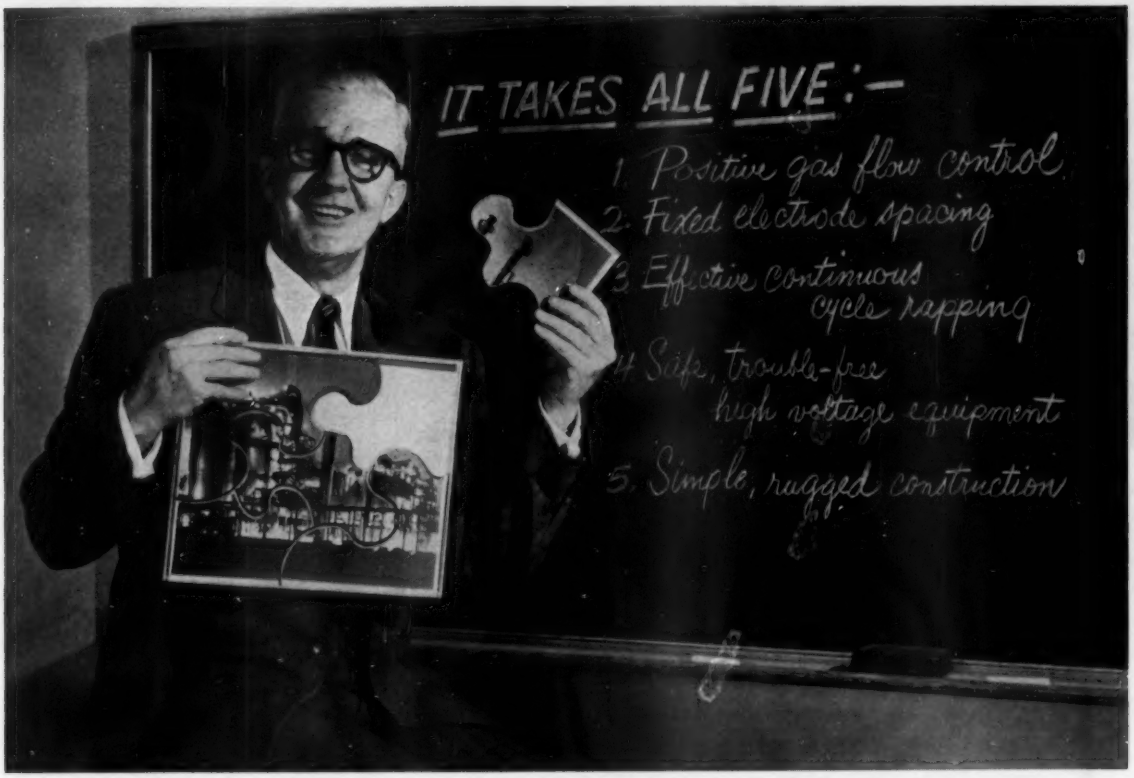
328 How to Cut Vibration—The use of Vibra-Mount felt in reducing machine vibration and accompanying noise is covered in this 20-pp illustrated booklet. Tells where this shock-absorbing felt is used effectively, how to select the proper mount, and how to install it. Cost information is provided, other felt products are listed. American Felt Co.

329 Vibro-Isolators — Bulletin K3A gives latest data on stopping vibration, shock and noise transmission by using company's steel spring machinery mountings. Typical case-histories, complete with installation photos, tell how vibro-isolators solved a variety of vibration problems. Tables giving capacities and characteristics are furnished, including isolator sizes, load capacities, dimensions, and shipping weights. Drawings illustrate typical installation arrangements. The Korfund Co., Inc.

SPACE, PROCESS HEATING

330 Unit Heaters—Bulletin 7517, 48 pp, presents full information on latest design of this company's Venturafin unit heaters for steam or hot water applications. Gives features of construction, general engineering data, capacity tables. Fully illustrated with photos of horizontal and vertical models, dimensional drawings and piping diagrams, booklet includes tips on the use and selection of unit heaters. American Blower Corp.

Buell 'SF' Electric Precipitators meet all 5 basic requirements for TOP EFFICIENCY


IT TAKES ALL FIVE :—
1. Positive gas flow control
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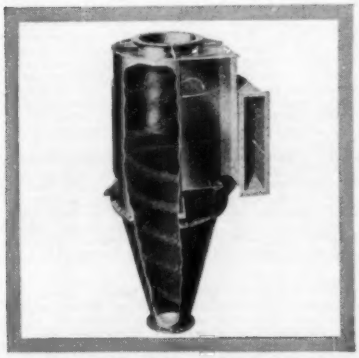
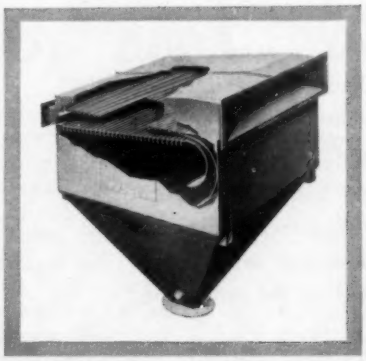
5. Simple, rugged construction

A slight deficiency of any single factor would be sufficient to impair the performance or service life of any dust recovery system. The constant top efficiency of Buell installations is the result of skillfully adjusting all five elements to best meet various operating conditions . . . provide consistent top efficiency.



Buell Cyclone Collectors are noted for their efficiency, too. Here are exclusive reasons why: shave-off design which harnesses back-flow and puts it to work . . . plus extra large diameter design to prevent "plugging."



Buell "LR" Fly Ash Collectors are ideal for low and high pressure boiler operations up to 2000 BHP, with either natural or mechanical draft. Check them for high efficiency, simple design, compactness, flexibility in layout.

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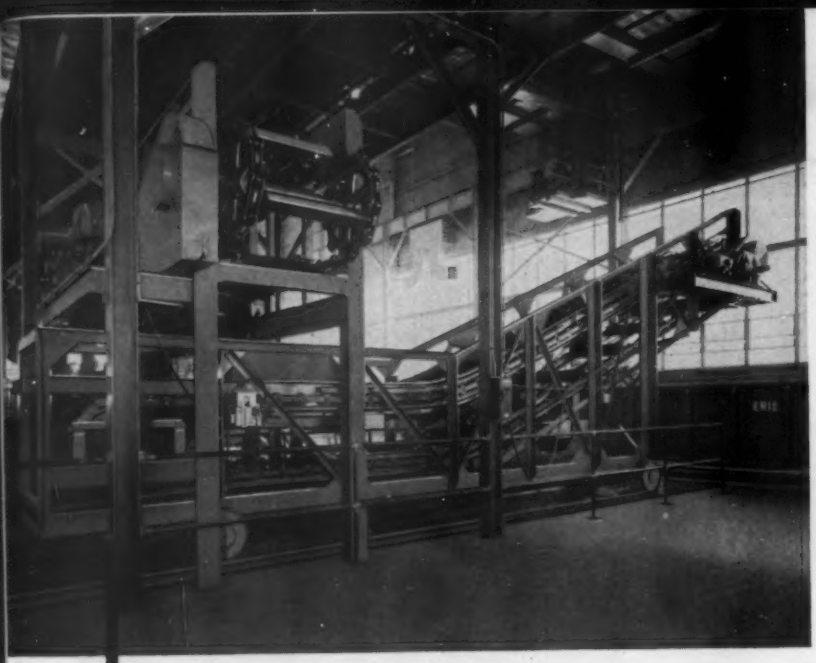

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Planet Pusher-Bar Conveyor Pays for Itself in Eleven Months

At a leading automobile plant, loading scrap from trim presses on to railroad cars formerly required a two-man crane and magnet operation.

Now . . . two Planet conveyors move baled scrap to waiting railroad cars *automatically* . . . saving $22,000 a year!

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- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

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DATA FILE

(Begins on page 206)

331 Plumbing, Heating Supplies—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

332 Unit Heaters — Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

333 Revolving Unit Heaters—Bulletin HR-64, 16-pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation on planning tips and specifications. L. J. Wing Mfg. Co.

334 Electric Heat, 101 Ways—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages obtained. To illustrate liquid heating, diagrams and photos show best applications for the elements and heaters. Similar treatment is accorded problems of heating air and gases; melting soft metals and viscous materials; and heating machinery and equipment parts. A section is devoted to far-infrared heating. Edwin L. Wiegand Co.

335 Hot Water Heating Systems—Catalog GK-954, 24 pp, features a complete line of equipment for forced hot water heating systems and chilled water cooling systems. Nine pages are devoted to information on a complete line of circulating pumps for dozens of applications. All-bronze pumps for circulating service water and silent operating centrifugal pumps for boosting water pressure are a few of the new applications. Valves, fittings, air vents, air tanks and water heaters are also described in detail. Bell & Gossett Co.

336 Hot Water for Industry—An excellent engineering data booklet, "Hot Water for Industrial Plants," is a compilation of literature covering use of water heaters for process needs, cafeterias, lavatories, wash fountains, laboratories. Discusses hot water requirements for these applications; describes and illustrates heaters, recovery systems, booster units applicable; provides installation suggestions and operating instructions. Available to qualified plant engineers, please state your title. A. O. Smith Corp.

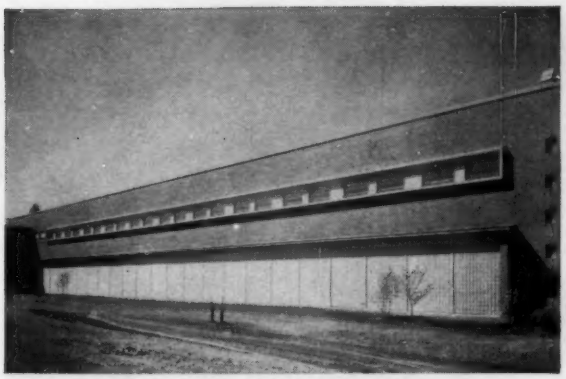
337 Industrial Ovens—Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

338 Industrial Ovens — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

LUBRICANTS, LUBRICATION

339 Automatic Lubrication—Sixteen-pp Catalog L-52 describes force feed lubricators of all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 units, 1 to 24 feeds per minute. Hills-McCanna Co.

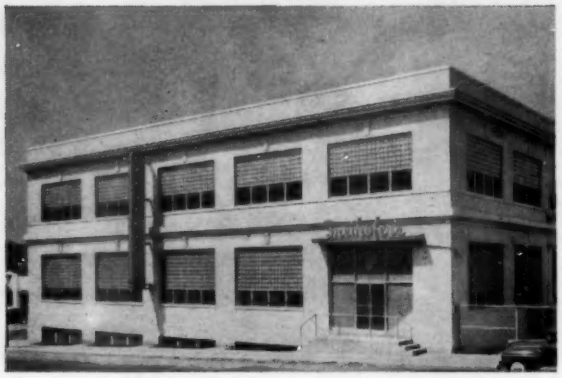
340 Colloidal Dispersions — Forty-four colloidal and semi-colloidal dispersions for opera-



The Mennen Co., Morristown, N.J.
"We saved on window shades"

New England Butt Co., Providence, R.I.
"We saved on heating costs"

Auto-Owners Insurance Co., Lansing, Mich.
"We saved on window cleaning"



Wm. Freihofer Baking Co., Wilmington, Del.
"We saved on sash repair"

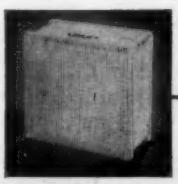
PC Glass Blocks . . . cure-all for window area problems

There's no doubt about it . . . window areas in plants and buildings *can* cause all kinds of trouble. Usually, it's trouble that means expense. Take, for example, window areas enclosed with ordinary sash. Frequently they rot, rust, or buckle, causing trouble that can add up to big maintenance charges in repair and repainting. And then there's window breakage and window shades. More bills and expense. When putty loosens and calking pulls away, dirt gets in, and with it come air leaks that throw an extra load on heating and cooling systems. This, and the recurring chore of window washing also cost money.

Seems almost too good to be true . . . but PC Glass Blocks solve all these problems. *Mortared* into panels, they give you window areas that are practically maintenance-free. No rotting, rusting, or buckling. Breakage is no problem and shades are seldom necessary. There's no putty to crack. Air-and-dirt-tight walls, plus the high insulation value of the blocks, reduce heating and cooling costs. Cleaning once or twice a year is all that's necessary.

In new buildings, or old, PC Glass Blocks can solve *your* window area problems. For more information, see us in Sweet's, or write Pittsburgh Corning Corporation, Dept. PG26, One Gateway Center, Pittsburgh 22, Pa. In Canada: 57 Bloor Street West, Toronto, Ontario.

PC Glass Blocks mean better light inside—
better looks outside



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Easier and faster. In Aerosol cans — no brushes or open containers. Dries hard quickly and adheres firmly, even to dirty or semi-greasy surfaces. Resists rubbing off or weathering. In fast, opaque colors also ideal for touch-up jobs.

18 COLORS

No. Color	No. Color	No. Color
10 Red	16 Brown	23 Black
11 Green	17 Pink	25 Aluminum
12 Yellow	19 Light Gray	36 Dark Gray
13 Dark Blue	20 Orchid	39 Clear
14 Orange	21 Copper	40 Tool Gray
15 Light Blue	22 White	41 Flat Black

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Please send further data on CROWN Color Code Paint and name of distributor.

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Company.....

Address.....

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DATA FILE

(Begins on page 206)

tional functions, maintenance, lubrication, and other industrial applications are listed in this revised booklet. Includes dispersions of graphite, molybdenum disulfide, mica, vermiculite, zinc oxide, and acetylene black. Carriers and diluents are given. Acheson Colloids Co.

341 "Fringe Area" Lubrication—Revised Bulletin 103A lists 17 types of molybdenum disulfide lubricants and features an explanation, with diagrams, of applications in extreme bearing pressure, and high, low and normal temperature lubrication. Five new lubricants are included. A selector chart describes each type, kind of carrier used in it, temperature range in which it operates best, and method of application. The Alpha Molykote Corp.

342 Proper Lubrication—Presenting proper lubrication as the life blood of all machinery, 36-pp Lubriplate Data Book 54-1 is a helpful treatise on modern lubrication practice. Gives product data on both oil type lubricants and greases and discusses choice of lubricants for use in applications involving heavy loads, high speeds, extreme temperatures, water conditions and other conditions. Provides tables of specific recommendations for various classes of equipment used in chemical processing, metal-working, other industries. Lubriplate Div., Fiske Brothers Refining Co.

343 For Better Lubrication—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in this pocket-size folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

344 Multi-Purpose Grease — This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, affords protection. Socony Mobil Oil Co., Inc.

345 Selection of Lubricants—Progress in the application of industrial lubricants is discussed in this 16-pp bulletin, No. 5 V.41 of company's lubrication magazine. Describes various kinds of oilers, centralized lubrication systems, atomized lubrication, and includes photos illustrating text. The Texas Co.

BOILERS, GENERATORS

346 Packaged Boilers — This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 30,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

347 Automatic Boilers—Bulletin BE-4 describes operation and advantages of Continental automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction; illustrates hinged doors and method of injecting air through static, turbine-like vanes into burner. Boiler Engineering & Supply Co., Inc.

348 Steel Boilers—Revised General Catalog 80, 32-pp, is a condensed but complete product guide on company's high and low pressure steel boilers. Also included are full descriptions and illustrations of water heating products, both direct fired and storage types as well as indirect water heating coils. Pages on boiler support brackets, structural steel suspension and induced draft fans, as well as pictures of installations are included. Kewanee-Ross Corp.

349 Packaged Generators—This 16-pp catalog covers a new series of packaged steam generators in sizes from 10,000 to 46,000 lb of steam per hour. Gives capacities, dimensions, construction features. Instrumentation is discussed. Illustrations include sectional drawings and installation photos. Booklet also provides a selection chart on firing equipment and controls. Foster Wheeler Corp.

350 Automatic Boilers—Advantages of company's packaged automatic boilers for light

What's your need for heat?

Whatever your heating job may be, you'll find the efficient, economical answer in . . .

CHROMALOX Electric Heaters

. . . for heating platens, dies, molds, metal parts . . . for heating liquids, air, gases . . . for curing, drying, baking . . . for comfort heating in offices and factories . . . for special applications . . . in fact for any application requiring fast, low-cost, controlled heat up to 1100°F.

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from the world's largest factory stock of industrial electric heaters . . . over 15,000 types, sizes and ratings.

Let the Chromalox Sales-Engineering staff solve your heating problems . . . electrically.

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Contains helpful information on design uses, and prices of Chromalox Electric heaters, elements, thermostats, contactors and switches.

To get some interesting facts about additional applications of electric heat, ask for Booklet F1550—"101 Ways to Apply Electric Heat."

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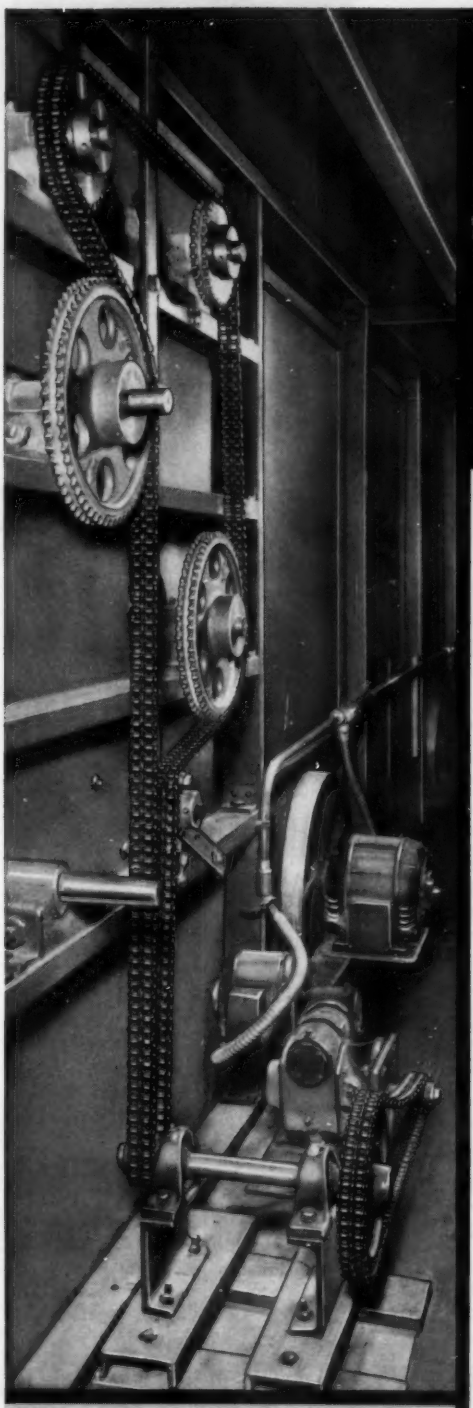
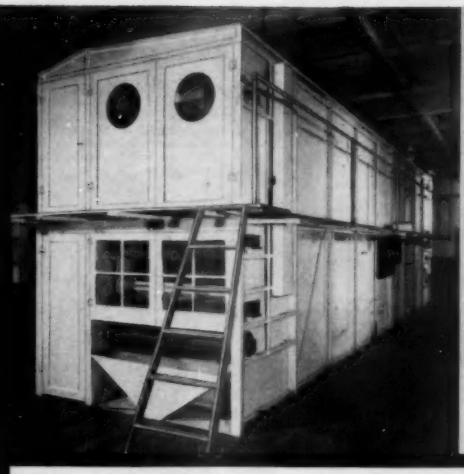


DRIVE DETAILS...

Drying oven of the Quality Macaroni Co., St. Paul, Minn. Diamond 2-strand roller chain for the serpentine drive and for the second reduction from speed reducer to drive sprocket.



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DIAMOND ROLLER CHAIN

Driving many shafts from a single power source regardless of shaft center distances is a job Diamond Roller Chain does easily, efficiently. Speed ratios are maintained exactly throughout the entire life of the drive. The high efficiency (98-99%) of Diamond Roller Chain Drives means a greater percentage of the input horsepower is transmitted for useful work. Light or heavy loads at high or low speeds are driven with the same smooth, positive power.

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ALWAYS PRELOADED. For many, many years, Diamond Chain has been preloaded after assembly for the purpose of bringing pin-bushing seating into stabilized relationship prior to field installation.

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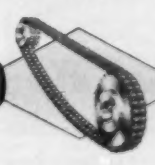

DIAMOND ROLLER CHAINS

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AIRCO

WELDING and BRAZING Hints

PROBLEM:

Brazing and Braze Welding Rod Selection

SOLUTION:

Airco #22 Manganese Bronze Rod. A general purpose rod that should be in every welding shop where high strength brazed joints are required. Flows smoothly and produces sound joints on maintenance work when used with either Airco Marvel Flux or Airco High Test Liquid Flux. Airco #22 is also available with flux already coated on the rod to insure positive base metal protection.

Airco #20 Bronze Rod. Ideal for braze welding of steel, cast iron, malleable iron, copper, and dissimilar combinations of these metals. Airco #20 is available as a pre-coated rod using Hi-Test Flux. When this rod is purchased bare, either Hi-Test or Marvel Flux can be used for high strength welded joints.

Airco #27 Low Fuming Bronze Rod. For the brazing or braze welding of steel, cast iron, or bronze. Low fuming characteristics of this rod increase its applications in restricted areas. Recommended fluxes for use with Airco #27 are Airco Hi-Test or Marvel Flux. Flux coated rods also available.

Brazing and Braze Welding Flux. A good brazing flux cleans the joint, removes oxides created by heating, and picks up impurities in filler metal. Airco Hi-Test Flux, when properly applied, will accomplish these jobs.

Send for this free catalog!
You'll find here the finest rods and fluxes for joining both ferrous and non-ferrous metals. Write Airco at address below.

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DATA FILE

(Begins on page 206)

oil, heavy oil, gas or combination gas-oil firing are outlined in Bulletin 1220. Describes two models, and includes ratings, dimensions and weights, as well as installation photos. Orr & Sembower, Inc.

VALVES, TRAPS, PIPING AND ACCESSORIES

351 **Choosing the Right Valve**—Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp booklet explains and illustrates basic design features of gate, globe and check valves. It tells in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and bonnet-joint characteristics are also discussed and stem-operation is treated. Crane Co.

352 **Corrosion Resistant Valves**—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific applications for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

353 **Reducing Valve Engineering Data**—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straightline flow, tight closing. A. W. Cash Co.

354 **For Quick Valve Selection**—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

The two Reader Service Cards on pages 201-202 are easy to use and need no postage. Just circle the item number of catalogs wanted.

355 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. Walworth Co.

356 **Valve Charts**—Now available to plant engineers are three well-organized wall charts on valve types, selection and protection. "How to know valves" covers four main types of valves from the standpoints of their appearance, inside construction, service intended, operation and use. "How to select valves" discusses five major factors involved in the choice of a valve—fluid, temperature, pressure, size, and function. "How to protect valves"—written in "do and don't" style covers 11 important points on valve installations, operation and maintenance. R-P & C Valve Div., American Chain & Cable Co.

357 **Plastic Pipe, Valves**—This 6-pp bulletin describes tough, corrosion-resistant Dur-Ace plastic pipe fittings and valves. Gives properties of Dur-Ace and includes table showing resistance to more than a hundred chemicals. Standard sizes and pressures of pipe are given, also sizes, weights, prices on pipe and fittings, diaphragm valves. American Hard Rubber Co.

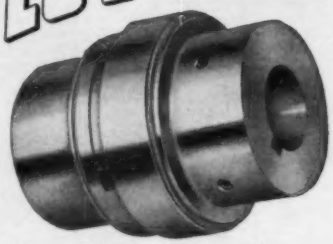
358 **Plug Type Valves**—Bronze plug type valves with 500 Brinell armor seat are illustrated and described in this 6-pp brochure, Form 202. Includes photos of various models, full specifications, as well as a cutaway view showing outstanding features. Jenkins Bros.

359 **Corrosion Resistant Valves**—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific

15 YEARS SERVICE WITH ONE SET OF CUSHIONS

... actual report on

LOVEJOY



Flexible Couplings

Up to fifteen years maintenance-free service is not unusual with Lovejoy lubrication-free flexible couplings.

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(Begins on page 206)

applications for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

360 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressure up to 1500 lb. W. H. Nicholson & Co.

361 **Steam Trap Reference Manual**—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap size and how to size condensate return lines is told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

362 **Valve Couplings**—Bulletin 551 presents engineering data on company's line of valve couplings, hose couplings and hose clamps. Includes dimensions for valve couplings, price list, and a table showing dimensions of standard hose couplings. C. B. Hunt & Son, Inc.

363 **Improved Hose Coupling**—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action that prevents hose twisting and kinking.—Titeflex, Inc.

364 **Wrought Iron Pipe**—Technical information required in specifying pipe and tubing is graphically presented in this 52-pp catalog. Tables list size and dimensional data of wrought iron pipe and tubular products, and show dimensions. Data is also provided on wire and sheet metal gages, flow of water in gpm and conversion factors. Tables include size and dimensional data for various types of pipe. Supplementary tables give information on wrought iron physical characteristics and special properties. A. M. Byers Co.

365 **Welded Fittings**—Catalog 3 is a 36-pp ordering and engineering reference book on company's Weldolets for piping services. Gives data on butt-welding and socket welding Weldolets as well as on Thredolets for making threaded outlets. Typical installations are pictured; sizes, weights and prices provided. Also included are installation instructions and a technical section. Bonney Forge & Tool Works.

366 **Corrosion-Resistant Fittings**—Lower installation costs, greater flexibility and improved flow conditions are among the advantages claimed for company's line of corrosion-resistant fittings described in this 24-pp bulletin. Includes photos, diagrams, and charts listing dimensions, other specifications. Horace T. Potts Co.

367 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between —300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

368 **Aluminum Jacketing**—Economy and reduced maintenance offered by use of company's aluminum jacketing for insulated lines are stressed in illustrated Form J-1. Details fast application, corrosion protection afforded, other advantages. Step-by-step photos show how jacketing is applied. Childers Mfg. Co.

PUMPS, COMPRESSORS

369 **For Hazardous Liquids**—Catalog Section D, 12 pp, presents company's line of Underwriter rotary pumps for hazardous liquids. Both mechanical seal and deep stuffing box models are shown and dimensions and specifications provided. Various mounting arrangements and drives available for these UL ap-

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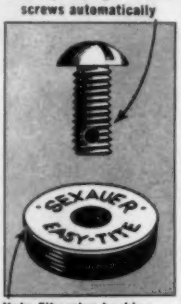

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DATA FILE

(Begins on page 206)

proved pumps are also cataloged, and application suggestions are given. Also in this booklet are performance graphs. Viking Pump Co.

370 **Condensation Pumps**—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. C. A. Dunham Co.

371 **Data on Pumps**—This 12-pp condensed catalog covers turbine-type and centrifugal pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

372 **Continuous Flow Pump**—Bulletin 30-C, 8-pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes photos, diagrams and specifications. Robbins & Myers, Inc.

373 **Condensed Pump Data**—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications and features. Goulds Pumps, Inc.

374 **For On-the-Spot Air**—Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

375 **Compressors**—Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

376 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines, and magneto ignition on all gasoline models. Le Roi Div., Westinghouse Air Brake Co.

377 **Gas-Engine Driven Compressors**—A two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Design and construction features are discussed. Clark Bros. Co.

FANS, BLOWERS

378 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stack-booster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

379 **Industrial Fan Catalog**—Of interest to plant engineers requiring quick, accurate selection of industrial fans for specified capacities, 28-pp Bulletin EX-531 contains selection tables from which correct fan for required capacity can be determined. Complete descriptive information, detailed capacity tables and dimensional data are included. Introduces a new fan offering improved efficiency. Bayley Blower Co.

380 **Roof Ventilators**—Bulletin A-112, 12-pp, contains engineering data on company's line

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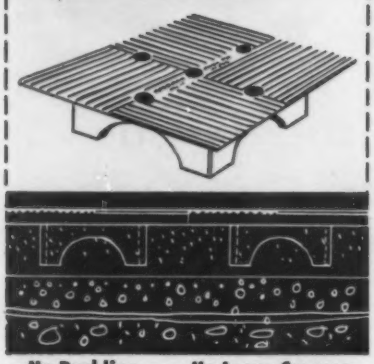

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DATA FILE

(Begins on page 206)

of roof ventilators designed to eliminate backflow of air and increase air delivery for maximum efficiency. Includes photos illustrating construction details, dimensions, cutaway views and dimensional drawings, as well as tabulated rating data. Hartzell Propeller Fan Co.

MATERIALS HANDLING

381 **Cranes for Big Jobs**—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

382 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb. capacities. Fully illustrates and explains design features and gives details on suspensions and conductor systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

383 **Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load-Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys. Manning, Maxwell & Moore, Inc.

384 **Overhead Cranes**—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance costs are detailed. Several pages are devoted to electrical information. Chicago Tramrail Corp.

385 **Transit Crane**—Twelve-pp Bulletin 15-B-TC-1 describes a transit crane of 15-ton capacity. Illustrated by job application photos and closeups of mechanical features, the booklet includes a list of specifications and working ranges, plus brief, easy-to-read description of the machines, advantages. Bucyrus-Erie Co.

386 **Floor Type Conveyors**—Catalog 51, 90-pp, contains engineering data on company's line of floor type conveyors, including belt conveyors, apron conveyors, bulk handling conveyors, chassis assembly conveyors, drag conveyors, flight conveyors, foundry block conveyors, log conveyors, mould conveyors, package handling conveyors, piano hinge conveyors, and others. Also covers other conveyor equipment such as conveyor chains, inclines and declines, cross sections, switches, sprocket turns, take-ups. Catalog is profusely illustrated with photos, schematic drawings, and includes full specifications. Jervis B. Webb Co.

387 **Conveyor and Elevator Belting Tips**—This 32-pp manual on installations, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastenings are also covered, and there's a table listing common conveyor belt maintenance problems. The B. F. Goodrich Co.

388 **Conveyor Trolleys**—A new line of ball bearing trolleys for overhead conveyors is covered in 20-pp Book 2536. Contains specification data for the selection of new trolleys, or of replacement trolleys for existing installations. Describes many features resulting in low operating and maintenance cost. Link-Belt Co.

389 **Metal Conveyor Belts**—This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

390 **Conveyor Belting**—Folder 54-3, contains a capsule description of construction,

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(Begins on page 206)

types of treated stitched canvas belting for all conveying and elevating applications. Describes company's general conveyor and elevator belt, oil- and acid-resisting belts to handle hot materials to 600 F. Imperial Belting Co.

391 **Continuous Power Conveyor**—Sixteen-pp Catalog A-96 describes a packaged overhead conveyor for light duty applications. This complete basic "package" contains drive unit, take-up, oiler and other items essential for a 50-ft system. Describes power drive unit, track, power chain and other components and discusses lubrication and chain safeguards. Suggested layouts are diagrammed, and some installations of these conveyors are illustrated. Richards-Wilcox Mfg. Co.

392 **For Heavy Moving**—How Mighty Movers solve heavy moving problems with economy, safety and speed is detailed in this illustrated folder. Lists various applications and includes specifications. Mighty Mover Co.

393 **Lift Truck Work Kit**—A method of predetermining the time necessary for fork lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as in planning for future needs. Includes typical materials handling examples to show technique for application of the data, as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

394 **Oil-Hydraulic Lifts** — Catalog RE-203, 20-pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units. Rotary Lift Co.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 201-202.

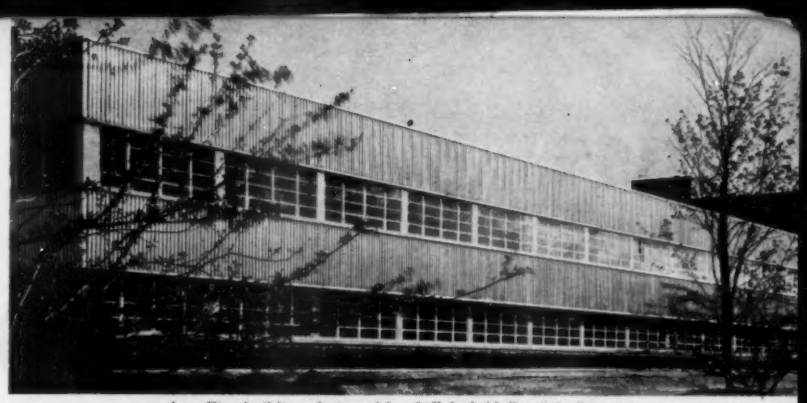
395 **Platform High Lift**—Bulletin 551-3 features a walking-type battery-powered platform highlift truck, company's Model PO-40. Gives specifications and advanced features of this unit which is designed to speed moving and stacking of skids, box tops, cases, crates. Barrett-Cravens Co.

396 **Sheet Lifter**—Operational and design features of company's sheet lifting equipment, which contributes toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Cullen-Friestedt Co.

397 **Shock Absorbing Casters** — Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

398 **For Hopper Economy**—"In Dollars and Sense" explains long run economy of company's self-dumping hoppers showing how they operate and telling how they fit particular plant requirements. Illustrated with photos, gives dimensions, weight of a standard 1-yd model. Roura Iron Works.

399 **Hydraulic Lifters**—Standard Products Bulletin 54, 12 pp, features new Worklifters, portable, battery-operated, hydraulic lifters available in a variety of special purpose designs, in a 1000 lb capacity, and with lifts up to 80 in. Also describes company's Shoplifters with both hand powered and electric hoisting units. Economy Engineering Co.



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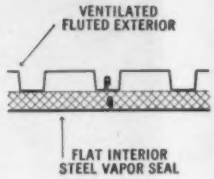

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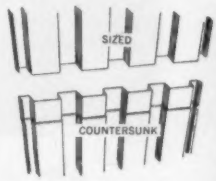

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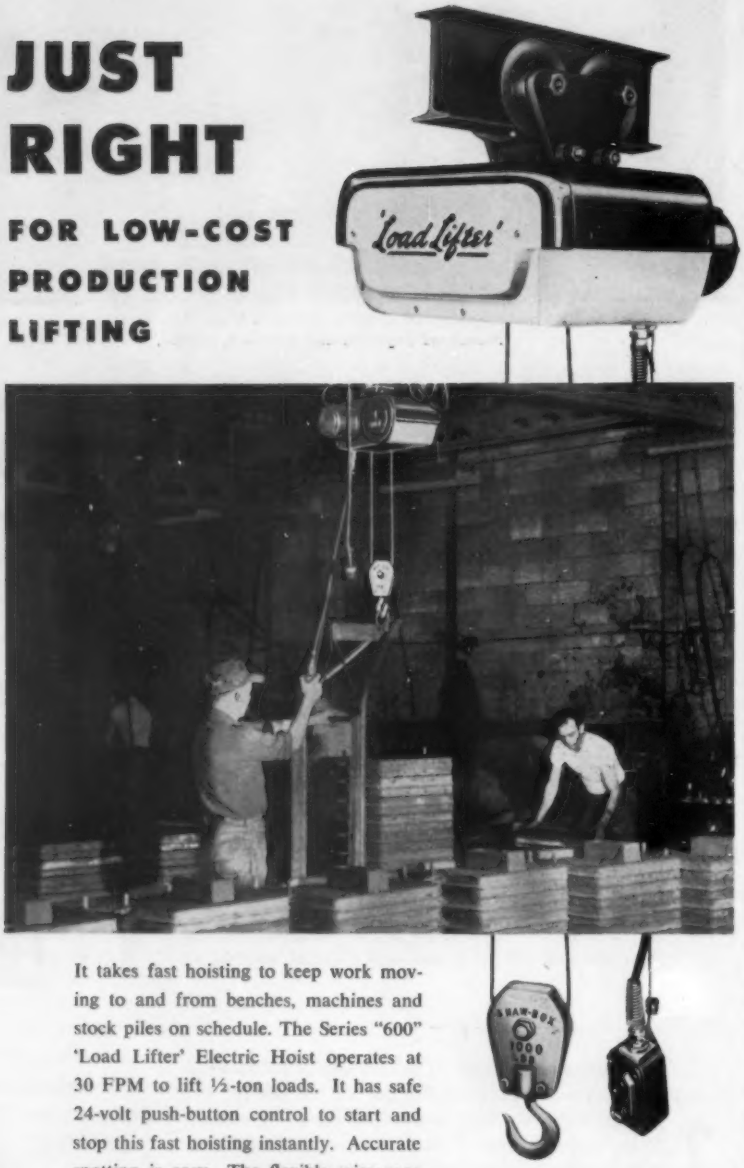

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DATA FILE

(Begins on page 206)

ELECTRICAL

400 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

401 Motor Starters—Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type HS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

402 Enclosed Switches—Catalog 83, 28-pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c purpose switches, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

403 FHP Manual Starters—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

404 Small Motor Switches—This 14-pp booklet describes a line of toggle, rotary and pushbotton switches—popular types designed to meet requirements of manufacturing, plant maintenance. Generously illustrated, this booklet also includes complete rating tables. Cutler-Hammer, Inc.

405 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

406 Commutator Slip Ring Maintenance—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

407 What You Should Know About Circuit Breakers—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

408 Electrical Conduit—This 8-pp bulletin, Form 646, describes company's heavy-duty, rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic soda, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

409 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electric equipment. Bulletin 35 (28-pp) covers 225-500 amp systems; Bulletin 40 (44-pp) 100 amp systems; Bulletin 45 (40-pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

DATA FILE

(Begins on page 206)

410 **Finding Fault Grounds**—This 32-pp illustrated booklet covers use of the Allen ground detector in the detection and location of electrical fault grounds. Separate chapters cover grounded vs ungrounded systems, operating instructions, explanation of misreadings encountered, complete cancellation, detection of fault grounds in lead-covered underground cable, tracing buried and/or hidden elements. Excel Electric Service Co., Inc.

411 **Battery Manual**—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

412 **Handbook on Storage Batteries**—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

413 **Motive Power Batteries** — This 48-pp general service manual on lead acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods including safety practices, acid handling precautions, and charging methods. C & D Batteries, Inc.

414 **Flexible Cords** — This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

415 **Wire-Wound Components**—Catalog R-200, a 36-pp guide to manufacturer's electronic components, describes subminiature resistors, precision and power resistors, IF and RF transformers and coils. Table and charts give specifications. I-T-E Circuit Breaker Co.

LIGHTING, COMMUNICATIONS

416 **Fluorescent Lighting**—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Sylvania Electric Products Inc.

417 **Guide to Luminaires** — Pocket-size, 28-pp Bulletin B-5799-BB covers fluorescent luminaires for industrial and other use. Summarizes salient features of each type of luminaire as it discusses electrical characteristics, maintenance and mounting data, details of construction, dimensions, and recommendations for application. Also contains a pictorial guide to floodlights and incandescent luminaires for industrial and other use. A 4-pp tabulation of buying data concentrates information needed for procurement. Westinghouse Electric Corp.

418 **Industrial Lighting Equipment** — Technical data on company's CFI-10 and CFI-25 industrial lighting equipment with porcelain enamel reflecting surfaces is featured in two new illustrated bulletins. Chief design features are pointed out and dimensional data are given. Day-Brite Lighting, Inc.

419 **Lighting Fixtures**—New Section K of Conduit Catalog 3000 describes components, performance data, and methods of relamping for any of the manufacturer's new EV series explosion-proof and weather resistant lighting fixtures. It contains illustrations showing steps for easiest relamping and installation of this type of fixture. Crouse-Hinds Co.

420 **Sound Measurement**—Form 797-C, 12-pp, outlines the many applications of sound and vibration measuring instruments and describes several models of sound level meters designed for measuring intensity of sound and analyzing its various frequency components. Includes specifications and full descriptions of the models, along with photos of the instruments in use and data on various accessories. General Radio Co.

421 **How to Use Sound Signals**—This 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

MECHANICAL POWER TRANSMISSION

422 **Sprockets and Chain** — Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Corp.

423 **Roller Chains, Sprockets**—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

424 **Power Transmission Equipment**—Form 118, 24 pp, gives descriptive and technical information on variable speed pulleys, wide V-belts, sheaves, motor bases, countershafts, and Select-O-Speed transmissions. Illustrated with photos and dimensional drawings, booklet provides ratings, sizes, application and installation tips. Lovejoy Flexible Coupling Co.

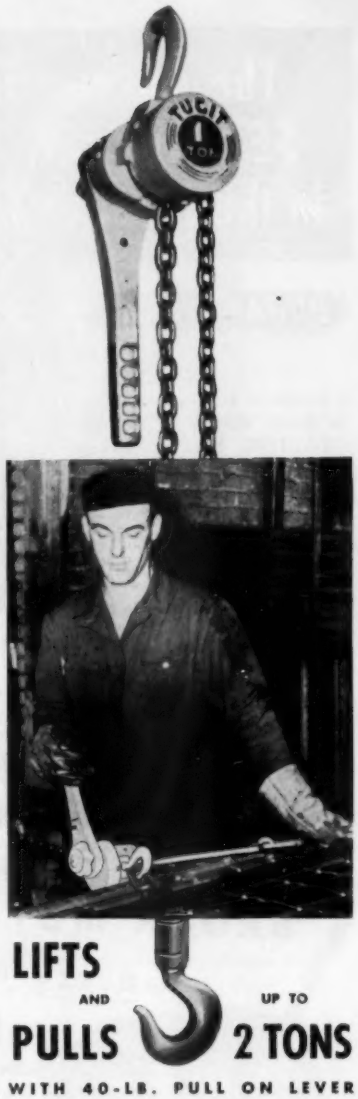
425 **Improved V-Belts**—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

426 **Adjustable V-Belt** — This 8-pp catalog covers company's Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install. A table shows current lengths for these belts. Manheim Mfg. & Belting Co.

427 **Shaft Mounted Drives**—Plant Engineers who use machines requiring input speeds between 420 and 10 rpm in the range between ½ and 30 hp, will be interested in 8-pp Bulletin 7101. Contains complete information — design data, selection tables, dimensions, weights, installation photos—on this modern type of standard gear drive designed for high ratios of speed reduction in limited space, with savings in initial and installation costs. The Falk Corp.

428 **Flexible Couplings** — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

429 **Fluid Couplings**—Bulletin 144-D, 14-pp, presents complete installation and performance data on fluid couplings. Illustrated with diagrams and drawings, bulletin shows ease of



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DATA FILE

(Begins on page 206)

applying company's fluid couplings on any type industrial equipment, powered by any type electric motor or internal combustion engine from ¼ to 850 hp. Describes standard models providing standard input, output combinations, and standard models in packaged units. Installation hook-ups are given, along with typical applications. Twin Disc Clutch Co.

430 Coupling Data — Bulletin 240 describes a quick-connect, quick-disconnect H coupling, its uses and construction, with particular reference to U-packer which gives positive seal without compression set because of rubber distortion. A fully detailed cutaway of coupling is included and dimensions and ordering information given. Snap-Tite, Inc.

INSTRUMENTS, CONTROLS

431 Control Centers—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided. The Clark Controller Co.

432 Versatile Electronics—How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexibility and application to a wide variety of installations are described. Minneapolis-Honeywell Regulator Co.

433 Gage Glasses—Pyrex and Corning gage glasses, their dimensions and tolerances, recommended maximum working pressures, are discussed in Bulletin EG-1. Explains how to cut odd lengths of tubular gage glasses and how to install them. Technical Products Div., Corning Glass Works.

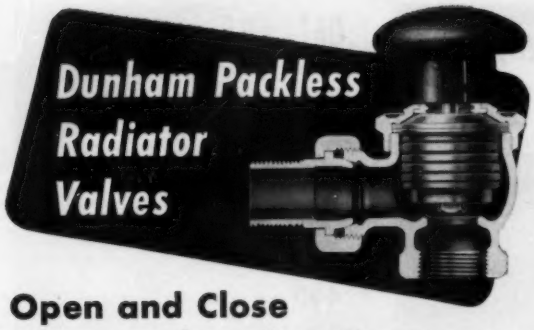
434 For Limited Panel Space—Bulletin 532 describes Model 216 indicator used with company's automatic tank contents gage. Bulletin contains a full illustration of indicator which, although occupying a small space, has a scale length of 20 in. Also included is a description of operation of gaging system and mounting dimensions. The Liquidometer Co.

435 Zone Control Equipment—Economical operation of the heating plant through use of a zone heating control system is the subject of illustrated 12-pp Apparatus Bulletin T-385. Describes a standard and clock model, discusses electronic principle of the control system, lists specifications. Schematic drawings point out applications, show dimensions of cabinets and of bulbs and accessories. Johnson Service Co.

436 Orifice Meters—Bulletin 1050 Rev. I, 28 pp, shows how manufacturer's orifice meters are made, how they operate. Tables give capacity data, and there are descriptions of manifold arrangements and differential ranges, along with illustration of various parts. Sketches show how meters are used. Rockwell Mfg. Co.

437 For Industrial Metering—Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

438 Temperature Controls—Eight-pp Catalog CC, on temperature controls and allied vides information on recording, indicating, non-equipment for heating and refrigeration, pro-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices and references to detailed literature. The Partlow Corp.



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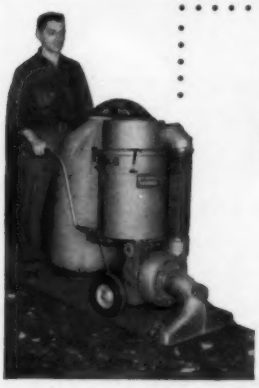

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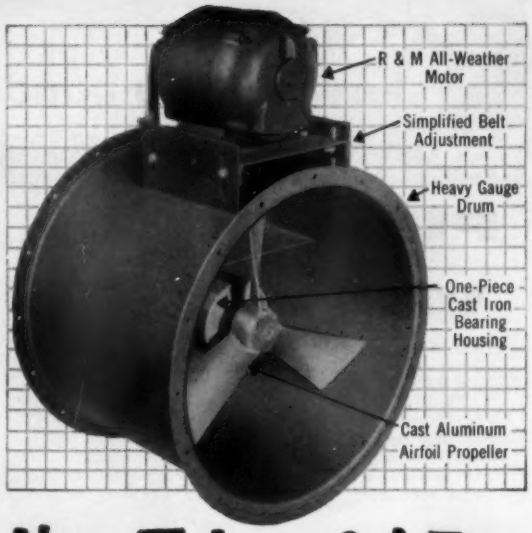
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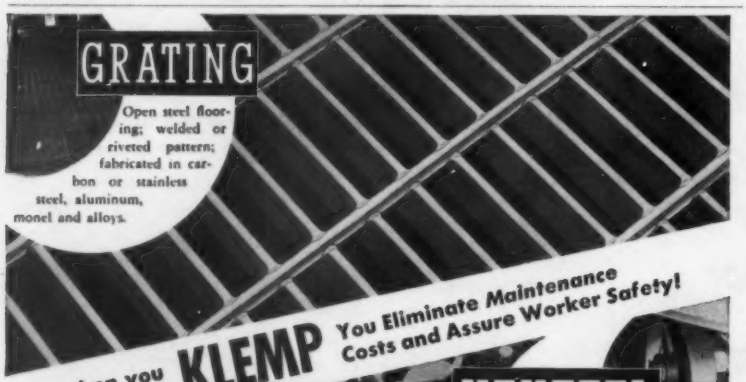
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DATA FILE

(Begins on page 206)

DUST CONTROL AND AIR CONDITIONING

439 **Dust Control, Blast Cleaning**—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of application. Pangborn Corp.

440 **Dust Control**—"Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

441 **Manual of Exhaust Hood Design**—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations shows various methods of hooding dust source. American Air Filter Co., Inc.

442 **Dust Collectors** — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

443 **Flexible Hose**—A set of five bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

444 **How Conditioning Units Can Help**—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling and on hot water and steam heating. Clarage Fan Co.

445 **Air Conditioning Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

STORAGE EQUIPMENT

446 **Storage Shelving** — Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

447 **Storage Equipment**—Catalog 100-E, 72-pp, illustrates and describes company's complete line of steel cabinets, folding chairs, chests and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and other specifications. Photos illustrate some typical equipment installations. Lyon Metal Products, Inc.

WATER CONDITIONING

448 **Testing Equipment**—Designed for use as a guide in the selection of water testing equipment, this 12-pp bulletin describes complete line of titration stands and tests for hardness, alkalinity, chloride, sulfide, etc.; cabinets and test set for similar tests; Conducto Bridge for determination of specific conductance of water solutions, colorimetric comparators; and the photometer. W. H. & L. D. Betz.

449 **Handbook on Demineralizing**—Comprehensive 40-pp Bulletin 5800-B compares various methods of water treatment, indicating the comparison between demineralizers and evapo-

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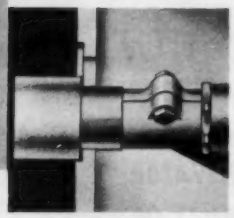

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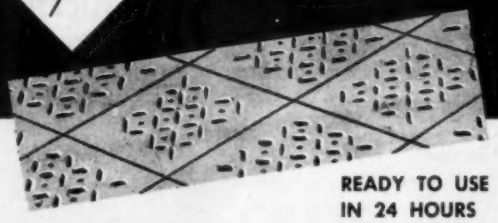

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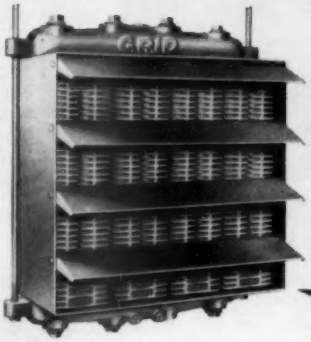

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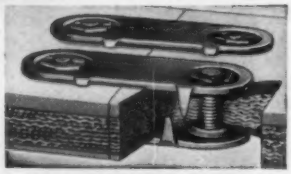

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(Begins on page 206)

rators. It discusses the characteristics of the various types of available cation and anion exchange materials and offers data on operating costs of demineralizing. It tells when to use 2-bed, 3-bed, 4-bed, mixed or mono-bed demineralizers. It also indicates when decarbonators or vacuum deaerators are required. The bulletin is replete with typical flow diagrams, photos of installations. Cochrane Corp.

450 For Industrial Water Softening—Greensand, zeolite and resinous exchange water softeners are described in 8-pp Form S105. Discusses features and applications of each of these basic types and illustrates some installations. Includes capacity data and general specifications. Also describes and pictures controls for water softeners, pressure filters and deionizers. Illinois Water Treatment Co.

451 Chemical Control and Testing — The need for intelligent chemical control and testing to assure the success of a water conditioning program is described in this 6-pp pocket-sized folder. Emphasizes need for explicit control limits and chemical tests to show that these limits are being met, and the proper technical skill required to prescribe these limits. Hall Laboratories, Inc.

OTHER EQUIPMENT

452 Economy of LP Gas—"The Aircraft Story," 8 pp, gives the report of a test made at one aircraft company, and results which another aircraft company obtained after converting their fleet of internal plant trucks to LP gas operation. Explains advantages of LP gas as an engine fuel and steps necessary in conversion of equipment to LP gas operation. American Liquid Gas Corp.

453 Preheating Combustion Air—This well-illustrated 36-pp booklet explains fuel savings

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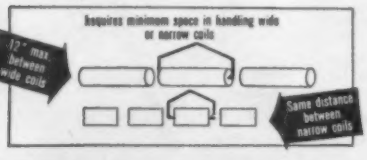

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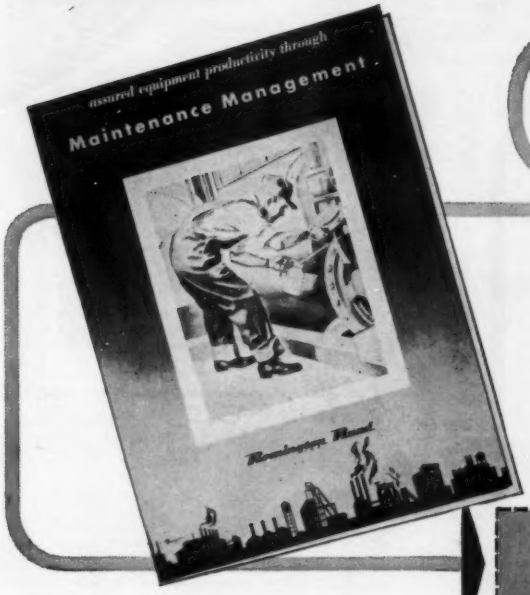

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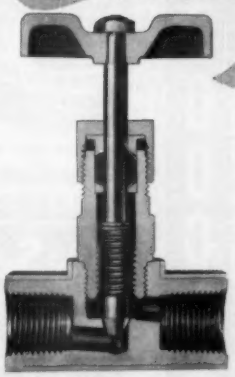

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(Begins on page 206)

and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

454 **Graphitization in Piping**—"Considerations in the Evaluation of Graphitization in Piping Systems," (Reprint TR-594) is a 10-pp illustrated article. Subjects discussed include sampling procedure; bend testing, impact toughness evaluation, and metallographic evaluation; uniformity of graphitization; and heat treatment. Grinnell Co., Inc.

455 **Burners**—This 16-pp illustrated bulletin describes company's line of burners for refining, processing, heating and generating. Includes photos of units, schematic diagrams showing design and operation, and full specifications. John Zink Co.

456 **Steel Reservoirs, Standpipes**—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Chicago Bridge & Iron Co.

457 **Teflon Products**—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing, and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

458 **Large Capacity Condenser**—Bulletin 123 describes the 400-ton capacity Aeropass condenser and fluid cooler. Explains and illustrates operating principles of the unit. Lists benefits offered for large liquid cooling and condensing applications. Niagara Blower Co.

459 **Production Control System, Procedures**—Publication X-1268, 56 pp, details a method of material control intended to result in a shorter planning cycle while speeding production by eliminating causes of delay on the production lines. Illustrated with typical forms and charts, book outlines procedures for engineering, production planning and progress, machine load, material and tool procurement and control. Remington Rand Inc.

460 **Insect Control**—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides are discussed in detail. Atomizers, mistorizers and fogging units are pictured and described as to advantages and applications. West Disinfecting Co.

461 **Improved Quenching Oil**—A quenching oil with thermal stability and high boiling range, particularly suitable for quenching systems requiring a high flash-point, is described in Form A-3073. Discusses advantages of this quenching oil and includes specifications. Sun Oil Co.

462 **Magnetic Selection Guide**—Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets, serves as handy guide to selection. Dings Magnetic Separator Co.

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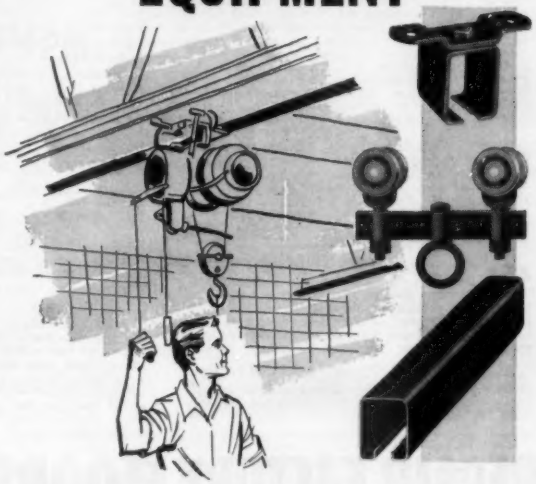

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(Begins on page 206)

463 **Machines for Special Products**—This 12-pp catalog lists company's machine tools and other metal fabricating, forming, treating and processing equipment which is now available for contact manufacturing. Types, quantities and operational dimensions of the facilities are included. The Jeffrey Mfg. Co.

464 **For Lining Vessels** — Bulletin 1012 gives details on a formula for lining steel vessels on the job and greatly extending their service life. Tells how to prepare and apply this inexpensive lining, includes data on coverage. Pocono Fabricators, Inc., Div., The Patterson-Kelley Co., Inc.

465 **Filter Fabric Facts**—This 16-pp illustrated booklet contains information about filtration principles; filtering devices; filter media; textile fabrics for filtration; a comprehensive chart on chemical and heat resistance of cotton and synthetic fabrics; sections on yarns, fabrics construction and finishing; and a round-up of filter fabrics in use. Photos illustrate variety of filter fabrics being produced for industrial use. Wellington Sears Co.

466 **Fighting Corrosion With Corrosion**—Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures, cathodic protection battery, and includes design and application data. Electro Rust-Proofing Corp.

467 **Packings for Chemicals** — Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

468 **Precision in Packaging** — The advantages of automatic machine packaging are outlined in this illustrated 24-pp bulletin. Describes various packaging and sealing machines, indicates kinds of packaging machinery now being produced. Illustrates various folding carton styles. Robert Gair Co., Inc.

469 **Finishing Systems**—Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors. The R. C. Mahon Co.

470 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

471 **Powder Metallurgy**—Manual E-55 is a 52-pp treatise on powder metallurgy, liberally illustrated with photos, tables, charts and graphs. Additional illustrative material is presented in case histories. Separate sections are devoted to bearings, component parts, and filters. Also covered are design, loads, and speeds, installation, press fit, close-in, shaft clearance, wall thickness, tolerances, temperature change, lubrications, machining, magnetic properties, flow rates. Physical properties of ferrous and non-ferrous metal powder materials are compared. Chrysler Corp.

472 **Filters, Strainers** — Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, performance data, and specifications. Purolator Products, Inc.

473 **Rigid Plastic Fabrications** — Eight-pp Bulletin 9-2 describes rigid plastic fabrications and pipe. Outlines use of Type I polyvinyl chloride in fabrication of exhaust systems and process equipment. Resistance characteristics and physical properties of the plastic are provided. Also includes section on plastic pipe and fittings. Tables on chemical and physical properties of Type I and II polyvinyl chloride and styrene copolymer rubber resin blend rigid plastic pipe are provided. The Atlas Mineral Products Co.

474 **Humidification for Profit**—Bulletin 500, 16 pp, includes physical data and prices on electrically controlled and air operated humidifiers. Handbook section explains how relative humidity affects hygroscopic materials, static electricity, health and comfort. Photos show installations and several pages are devoted to selection and installation tips. Many helpful tables included. Armstrong Machine Works.

475 **Ductile Iron**—Cast iron that can be bent is described in this 28-pp revised edition, with tables, charts and photos. Photos show applications of ductile iron castings, and bulletin lists typical applications in various industrial fields. The International Nickel Co., Inc.

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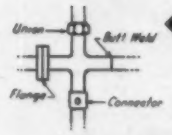

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(Begins on page 206)

476 Self-Locking Nuts—This folder describes Flexloc self-locking nuts; shows how the locking action of the one-piece all-metal nut can be used either as locknut or stop nut. Applications of the nut are illustrated in small drawings. Standard Pressed Steel Co.

477 Hot-Dip Galvanizing—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance, initial and maintenance costs. American Hot-Dip Galvanizers Assn., Inc.

478 High Temperature Thread Compound—The advantages of company's thread compound for use in high temperatures are outlined in this informative pamphlet. Lists chemical properties, describes application and function, and offers comparison data on performance of compound. Felt Products Mfg. Co.

479 Fire Hose Reels—Sixteen-pp Catalog H-511-F describes hose reels for fire fighting equipment, with illustrations of various models and cutaway view showing component features. Specifications, as well as descriptions of operational advantages are included. Clifford B. Hannay & Son, Inc.

480 Felt, Felt Products—This 24-pp technical design book describes hundreds of uses of felt, with emphasis on mechanical applications. Explains and illustrates how felts are used for their friction qualities, for cushioning, for filtering, for insulating, for sealing, for spacing, and as wicking. Gives design properties of felt and discusses 10 reasons for its importance to industry. Also tells how to select the proper felt. The Felters Co.

481 Advice in Washrooms—Information on company's washroom advisory service is available to plant engineers. Tells of plants and specific suggestions for improving washrooms included in this service. Scott Paper Co.

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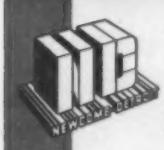

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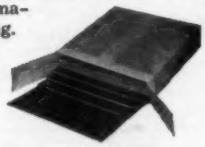

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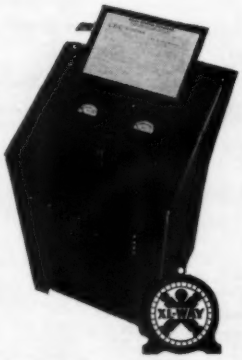

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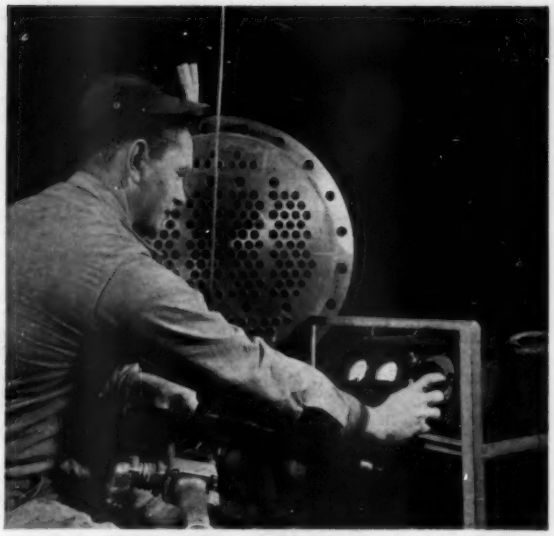

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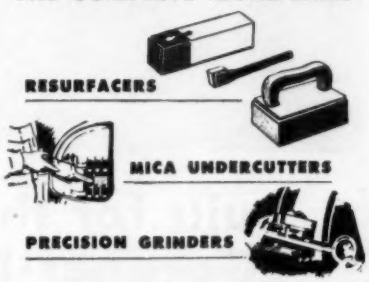

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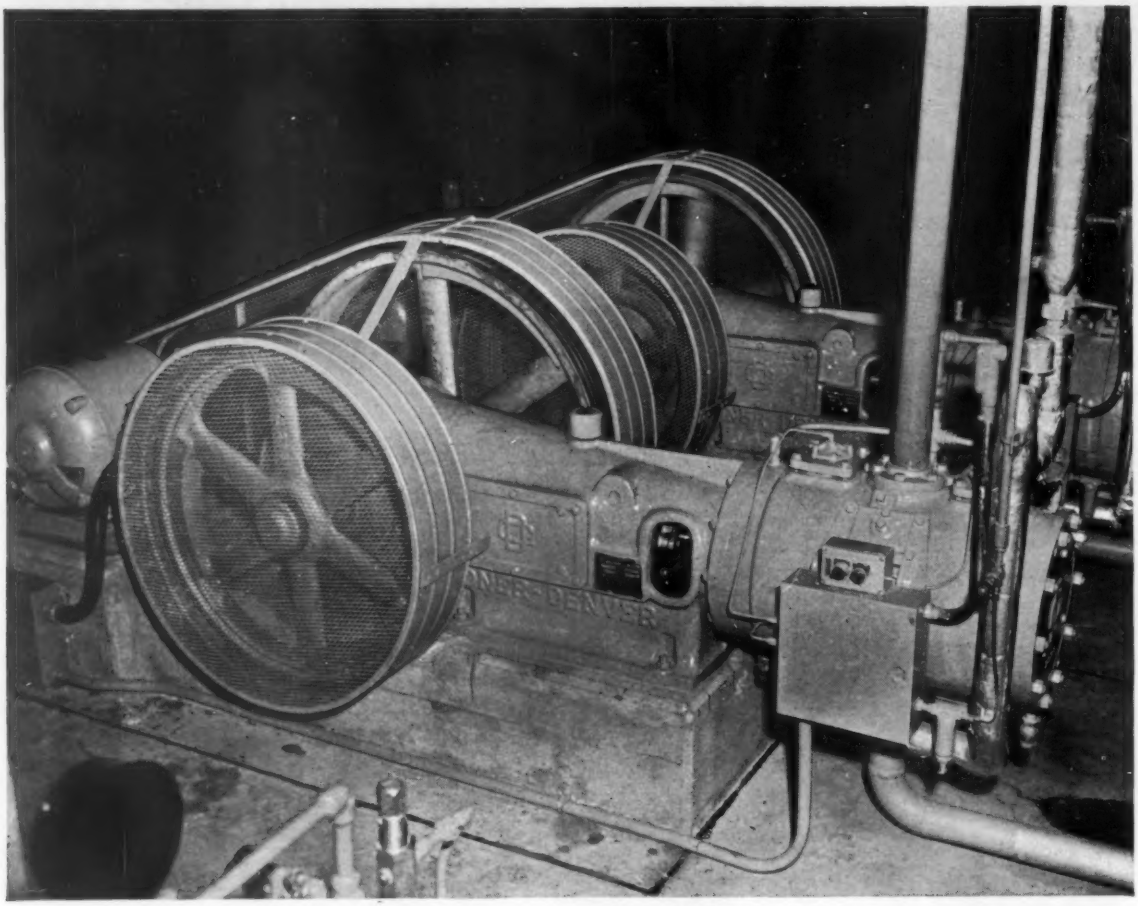

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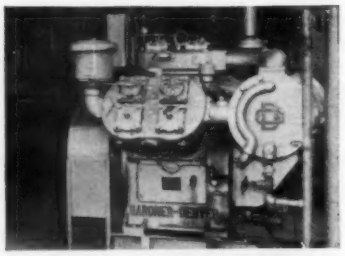

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STAYNEW

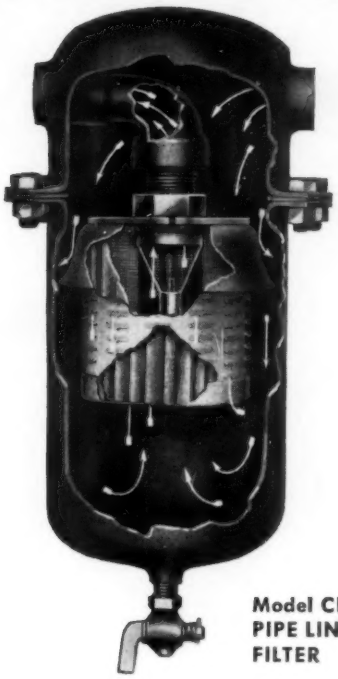
PIPE LINE FILTERS

FOR

CLEAN DRY AIR

IN

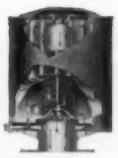
- AIR OPERATED INSTRUMENTS
- AIR OPERATED TOOLS
- PNEUMATIC CONTROLS
- INDUSTRIAL PROCESSES



Model CPH PIPE LINE FILTER

MODEL CPH PIPE LINE FILTER has exclusive Staynew "double action principle." Air is first deflected to outer walls of filter and forced downward at high speed. Water, oil and heavier particles of rust, etc., are thus deposited in base. Mechanically cleaned air then rises to pass through filtering medium which removes lighter airborne particles. This double action design eliminates need for frequent cleaning.

Inexpensive, simple to install and maintain, Staynew Pipe Line Filters keep your air-operated equipment free from the destructive effects of pipe scale, dust, dirt, and condensates. And, Staynew Filters pay for themselves in reduced equipment maintenance costs alone. They filter compressed air under all pressures and temperatures, natural and manufactured gases. Dollinger engineers will welcome your filtration problems. Why not call on us. Remember, Dollinger *makes* every type of filter for every industrial need.



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AUTOMATIC AIR FILTERS

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WHAT'S NEW IN MOTOR CONTROL? ★ ★ ★ GET IT FIRST IN CUTLER-HAMMER

Industry Here Finds Savings in the Stars

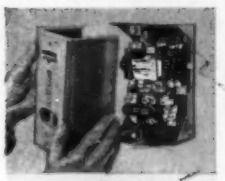
Cutler-Hammer Three-Star Motor Control

Thousands of electric motor users now know the three silver stars on the nameplates of the new Cutler-Hammer Three-Star Motor Control are no meaningless decoration. They stand for three entirely new standards in motor control value and performance . . . for important practical economies no industrial plant can afford to ignore.

Compare Cutler-Hammer Three-Star Control with all other control and *see* the difference. It installs easier . . . so much easier that savings in installation costs often pay for this control. It works better . . . so much better that this control often pays for itself many times over just by the production interruptions it avoids. It lasts longer . . . so much longer that this control *never* requires maintenance care or cost in all normal use. Make your own comparisons and *know*.

Your nearby Cutler-Hammer Authorized Distributor is stocked and ready to serve you. Order from him today. CUTLER-HAMMER, Inc., 1447 St. Paul Avenue, Milwaukee 1, Wisconsin.

CUTLER-HAMMER
★ ★ ★
MOTOR CONTROL
C-H



3-D Accessibility

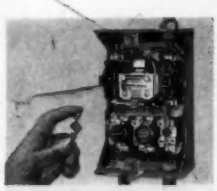
Removing the wrap-around cover bares the entire starter for three-directional accessibility. It is wide open at front and both sides. You can see everything and reach anything. Wiring the starter is so simplified and complete inspection is so easy no detail is ever neglected.

Unit Panel Construction

The entire starter mechanism can be removed from its case by simply loosening three screws. With mechanism out of the way, mounting case, connecting conduit and pulling wires is a cinch. A great time saver. No skinned knuckles. No damaged starter mechanisms.

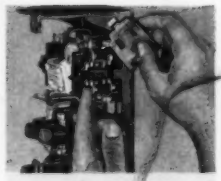
Full Three-Phase Protection

Only *three* overload relays can provide positive three-phase protection to stop needless motor burn-outs and production interruptions. And only Cutler-Hammer offers three overload relays in standard starters to avoid the costs and delays in special construction.



Adjustable Overload Coils

Only the accurate adjustment of overload protection permits motors to work harder without damage. Now more important than ever with newer type small frame motors. Adjustable overload coils here provide an accuracy of 3% instead of 10% to 12% in other makes of control.

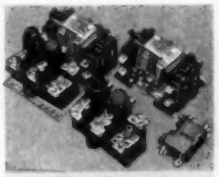


Superlife Vertical Contacts

Now the famous Cutler-Hammer dust-safe vertical contacts have been doubly improved. New light-weight design cuts bounce to reduce arcing. Also, arcing is now pressure-quenched. Contact maintenance care and costs are ended for all time in normal control uses.

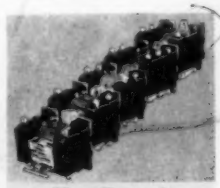
For Control Panel Designers

New Cutler-Hammer Three-Star Motor Control is star-studded with exclusive new features that provide opportunities for better circuit planning, for compact control panels, for better motor protection and better control performance. Write now on company letterhead for panel design handbook giving complete data.



New Control Components

All parts of the Three-Star Starters in NEMA Sizes 0, 1 and 2, as well as the complete starters on convenient unit panels, are available as components. Electrical interlocks provide additional control circuits as needed.



New Control Relays

Finest of control relays. 10 and 15 Amp. 2-3-4-5-6 poles. All contacts instantly convertible from NO to NC or vice versa. NO or NC status seen at a glance without removing cover. New armored coils color coded for voltage and frequency.

New Oil-Tight HD Pushbuttons

Amazingly compact, one-hole mounting, oil-tight, heavy-duty pushbutton units. Wide choice of button types and colors. Easily added additional contacts permit almost unlimited circuitry. Selector switches and indicating lights to match.

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Plant Engineering

IN THIS ISSUE

Maintenance Tunnel Worth Cost 83
Maintenance Control by the Clock Provides Yardstick for Measuring Costs 86
Building in a Sausage Casing 92
Plastic Pipe Gets a Handbook— Facts Compiled for Industrial User 93
Quartz Lamps Expand Infra-Red Uses 96
Steam Vapor Removal 98
Flushing Sprinkler Systems— Recommended Steps to Follow 100
Conveyor Tows on Two Levels 102
Longren's Production Team— How It Raises Plant Efficiency 105
Stud Driving with a New Hand Tool 107
Before Treating Steel Surfaces 108
Wood Is Versatile, Strong, Economical 111
Kodak Trains Drivers, Cuts Accidents 114
Thermocouples—Industrial Watchdogs Need Testing and Protecting 116
Plant-Designed Shell Molding Equipment 120
Climate's Fine for Plant Pools 122
New Developments and Applications 124
Two New Chapters for AIPE 126
Industrial Hose Delivers the Goods 128

REGULAR DEPARTMENTS

'Round About With the Editors 2
Bulletins and Catalogs 21
Backtalk About Our Past Issues 28
Plant Engineers' Digest 36
Operation and Production 52
Construction Briefs 77
News from the Plants 132
New Plant Construction 136
New Products and Processes 138
Industrial Films 193
Review of New Books 196
Data File of Commercial Literature 206
Advertisers' Index 232

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The magazine that helps plant engineers with their everyday problems